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THE GAS MAN'S NEWSPAPER 718691

GAS ENGINEERS
AND CONTRACTORS
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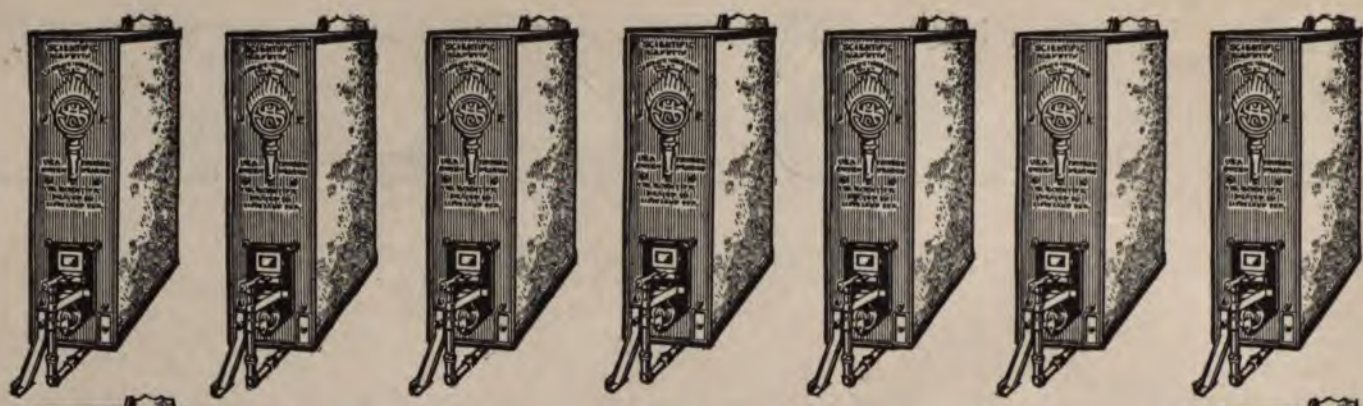

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Is Sales "Engineer" Effective?

Increasingly Difficult Problems in Industrial Gas Sales Suggest Separation of Engineering and Salesman Duties—Offers Plans for Increased Efficiency

By G. D. Crain, Jr.

"Sales engineer" is a term which has come into quite general use during the past few years. It suggests a type of man who is exceedingly useful, and likewise necessarily versatile. In the industrial promotion department of a gas company, for instance, the sales engineer is likely to be an important person, not only going out in the field and soliciting the business of prospective consumers, but undertaking to solve their engineering problems for them into the bargain.

And these problems, incidentally, are many and varied. The sales engineer may find himself up against such a tough proposition in some cases that the engineering phase is the whole story. In other words, no progress can be made from a selling standpoint until the engineering question is satisfactorily answered. It is this situation which has resulted in some gas men wondering whether the combination of duties is the best possible arrangement of the work in the industrial division.

It goes without saying that the two features are closely related. In few cases can a cut-and-dried, standardized argument be created that will enable the salesman to go blithely forth and preach the use of gas to every prospect on his list. Instead, he must get down and make a minute and searching study of the manufacturing problems of his prospect, and fine out in what way gas may be applied to the solution of those problems. And the moment he gives up "selling talk" for the scrutiny of the work to be done, he is ceasing to be a salesman and becoming an engineer.

It is a fine thing for a company to have on its payroll a man who is engineering-wise, and who does not need to come back to the office and report that he is stumped by certain conditions in a manufacturing plant. If he does not have to send out an S. O. S., but proceeds to make the necessary investigation on his own account, it makes a smooth running department, and less trouble for the people in the office.

On the other hand, the man who is an ideal sales engineer, and in whom selling enthusiasm and engineering judgment are nicely balanced, is a rara avis. A lot of men with engineering ability can learn how to sell, and master the routine of going after an order; but it is in the exceptional case that one end of the work is not given prominence at the expense of the other. For instance, suppose the gas company representative has a list of live prospects, who need to be followed up closely, and to be subjected to the pressure required to close them. Suppose also that he meets a situation which requires a lot of investigation and study of technical operating conditions in a certain field—one where use of gas on a large scale would result if the problem were worked out successfully. The real engineer is going to be attracted by this situation, and will jump in and make that proposition his chief business in life—and in the meantime some of those prospects are getting cold.

Disadvantages of Combination Duties.

That happens often enough to suggest that the man who has nothing to do but sell, and who concentrates on getting the business, without doing too much engineering, has an advantage over his confrere who is handling both ends of the work. In fact, a certain sales-engineer connected with one of the biggest gas companies in the country recently remarked that he felt handicapped because of the combination of duties which fell to his lot. "Here I am," he said, "working on a lot of exceedingly complicated questions in connection with the use of gas furnaces in the brass castings business. It presents some interesting features, and I find the work interesting. But this is taking a good deal of time and attention, and in the meantime I know of places where I could go and possibly line up contracts, because conditions are favorable and there are no engineering problems to be met. But for the present I am tied up with this work, and it cannot well be postponed. I must pursue the subject to its logical conclusion, and then resume my sales work with the engineering data in hand.

"I realize that this arrangement is not getting the most out of the possibilities of the situation, and that it is not an ideal plan from the standpoint of business production. Still, if the engineering features are not to be neglected, this is the only way to handle the work—that is, to deal with each engineering question as it comes up. Personally, I should like to be assigned to one branch or the other—to devote myself to the engineering end, without any sales features to handle, or to work on selling without

having to undertake engineering investigations."

Engineering Knowledge Needed.

It goes without saying that a salesman in a field like this, calling on industrial prospects, must have some engineering knowledge. But whether he should be qualified to make engineering investigations, and should actually make them, is another question. Familiarity with the general situation, and in handling data produced by engineers, would strengthen any salesman of the caliber and intelligence required for this kind of work. He would be able to use engineering results, in other words, without necessarily having to produce them.

The man engaged in the engineering department, without having to handle the actual solicitation of prospects, can go into a question with fewer mental reservations than are naturally held by the man with an interest in the sales question. While the engineer is favorable to the development of conditions which will justify use of the product, his attitude is unbiased, and his investigations are not hampered by the question of the effect of his results on the sale. And by being entirely free from this question, he can really produce better data for use in sales work than if he were looking after the latter as well as the purely technical end.

Ideal System for Sales.

The ideal system would seem to involve having salesmen, well trained and thoroughly familiar with the general problems of the industries in which they are working, but relieved of the responsibilities of handling the engineering phases. They would be supported by engineers, so that whenever a problem involving investigation presented itself, it could be turned over to the engineering department for study and report. The salesman in the meantime would continue to solicit his prospects, and to keep after concerns which required straightforward sales methods. Thus the impetus gained by previous work would not be lost, and in the meantime the engineering work would have been carried forward to the proper point.

One of the largest machinery concerns in the country uses an interesting plan in this connection. Each department is in charge of an engineer, who also is concerned with selling. But he does not do any actual soliciting, this being up to the men in the field, whose duties are confined to sales work. What the engineer does is to study the possible uses of the machines in his department, working out new industrial applications and taking care of engineering questions which arise in connection with their use. The salesmen are free to put up to him any questions which are presented by customers or prospects, and the engineer, who has devoted himself exclusively to his specialty, is able to take care of them easily.

The engineer thus serves the needs of the salesmen, as far as supplying them with data about his line is concerned; but he goes further and educates them in every possible way, striving to enthuse them regarding the sales possibilities of the products with which he is concerned. He is to this extent competing with the heads of other departments, who are doing the same thing; but in the meantime the salesmen are kept informed regarding sales opportunities for the numerous products of the manufacturer, while any questions which they may meet with in handling the actual field work are readily taken care of by the engineers in charge of the several departments.

This arrangement seems to be one which could hardly be improved upon. It is not practicable to have a separate salesman for every item in the line, but by putting it up to department heads to keep the general salesmen posted, interest and familiarity on their part is assured .

Applied to Industrial Sales.

The same idea could be applied to selling gas for industrial purposes. The industrial field might be divided along certain lines, with an engineer in charge of each section. He would take care of the engineering phases of the industries coming under his supervision. But the actual sales work would be done by men devoting themselves to this task, and supplied with engineering ammunition by those in the latter department. This would not mean a separation of sales and engineering work, nor that those in one department would have no interest in the other; but seemingly it would make for effective concentration, and for team-work of a type which would meet the necessities of the situation.

Why Sales Engineer is Handicapped.

The average salesman is necessarily enthusiastic. It is his business to be so. He must make his prospect feel that his proposition is attractive—so attractive that it cannot be pushed aside. The attitude of the engineer, on the other hand, is judicial. He must be calm and consider defects and disadvantages along with strong points and benefits. He cannot enthuse, because too much enthusiasm might warp his judgment.

That is why the sales engineer, who is handling both kinds of work, is handicapped. If the two elements are not blended carefully, the salesman is likely to go further than engineering facts warrant, or the engineer develop less "pep" than is essential for successful sales work. With one supplementing the efforts of the other, however, and backing up sales work with engineering data, the percentage of prospects closed should reach the maximum. This is something for gas companies to consider in connection with development work in the industrial field.

Patriotic Display by Utility Company at Ottawa, Ill.

Patriotic Window at Ottawa Stirs 'Em Up.

The Public Service Co. of Northern Illinois had a window at Ottawa recently that made the pedestrians "stop, look and listen." A battlefield scene was made up with a Pittsburgh automatic for a gun and Lion tank heaters for the shells. Upon a background was painted a group of marching soldiers. Above them an aeroplane hovered. A Red Cross poster occupied a prominent place in the window.

Hot Water Deluges Hoosiers

Hollis of Terre Haute Puts Over Whirlwind Campaign on Automatic Gas Water Heaters— His Publicity Stunts Arouse Widespread Interest

What was previously its record of automatic water heater sales for one year was exceeded by more than 50 per cent. in one week's time by the commercial department of the Citizens Gas & Fuel Co., of Terre Haute, Ind. This remarkable result was obtained in a nine-day sale, lasting from June 4th to 13th, during which time 81 auto-

Announcing Water Heater Week.

matic heaters were connected to existing services, the total contracts amounting to $8,955. While this did not reach the 100 mark, which Commercial Manager F. E. Hollis had previously determined upon for this campaign, yet had it not been for the terrific downpour of rain on Saturday, June 9th, and Wednesday, June 13th, this mark would probably have been exceeded. Both of these days had been worked up as a climax for the campaign.

Advertising a Factor.

Advertising was a dominant factor in this sale. Large space in the daily papers set forth in convincing style the advantages of hot water service, the 30-day free trial being featured prominently in each advertisement. All heaters were installed free and an allowance of $5.00 was made for old water heaters. All of the ads were laid out and written by Mr. Hollis. Response to these advertisements exceeded all expectations and telephone inquiries concerning the campaign numbered in the hundreds.

Previous to the campaign the company's salesmen canvassed nearly every house which might be interested in automatic water heaters, and mailed these customers the following announcement:

SPECIAL NOTICE

COMING SOON—BIG SALE OF

GAS WATER HEATERS

If you are interested in this sale, fill in blank below and hand to one of our representatives and we will notify you when shipment arrives.

Name .....

Address .....

Phone Number.....

CITIZENS GAS & FUEL CO.

123—Both Phones—123

636 Wabash Avenue Don't Miss This

During the week of June 4th to

Group of Ads Used at Terre Haute, Ind.

June 9th the better class of homes were canvassed and a large number of additional prospects secured. These were worked hard every day, and as many as six calls were made on several prospects before the order was finally secured. The office was open every evening and automobiles were furnished for anybody who was unable to come in their own machine. An attractive window display was arranged, in which was demonstrated the operation of the heater and several heaters connected in the office showed the amount of water delivered by the various sizes. Two of the Rudd Co.'s salesmen were on hand in addition to the district representatives.

A notable feature of the campaign was the large size of heaters sold, 3.16 gallons a minute being the average

Full Page Ad. on Water Heaters.

capacity. The sales of Friday, June 8th, reached 14 and beat the best weekly sales ever made. The highest mark ever reached at Terre Haute for a monthly record previous to this was 17. The annual revenue to be derived from the automatic water heaters sold will be approximately 3,174,000 cubic feet per year. "This is a desirable consumption," states Mr. Hollis, "and offers food for thought for other companies. For instance, to procure a factory to use the same amount of gas a gas company would run several miles of mains and make a tremendous investment in equipment, if they were sure of such a revenue, and yet in a day's notice this entire output could be lost through poor business, faulty shipments, a fire, explosion or strike. In order to lose this entire output gained from this sale, 81 residences would have to burn down or become vacated, a condition which is difficult to conceive. We likewise secure the highest possible rate for our gas from

each heater, while the industrial plant using gas for heat treatment would obtain the lowest. Nor did we have to extend a service.

Advance Notices of Sales.

One idea recently inaugurated by Hollis which is exceeding his expectations is that of an advance notice on all big sales. In other words he "covers the town" with small notices the same as any circus or theatrical troupe would do before putting in appearance. The idea presented itself to Hollis after reading advance notices of a coming play. It appealed and suggested a way to get more business. If advance notices can "sell out a house" for an amusement why can't it do big things for a company selling necessities? The answer is, it can, and it is doing this very thing at Terre Haute.

Holman Gives Electric Fans To Women Cannists.

In St. Louis the Laclede Gas Light Co. is working with the Women's Central Committee of Food Conservation in placing the N. C. G. A. gummed label booklets and folders in proper hands. President Holman visited the co-operative cannery to give things the once over. The result of his visit was a gift of ten big fans to help keep the kitchen cool. This present made a tremendous hit with the women and the community in general. Among the numerous newspaper mentions of the incident was an illustrated feature story headed thus:

MELTING CANNISTS GET FANS

Charlie Holman Sends Ten of Them to Conservation Cannery

Measures, Mops and Melts

Laclede Gas President Nearly Dissolves in Women's Food Factory

Water Heater Week at Flint and Lansing, Mich.

Water Heater Week scored a big success at Lansing and Flint, Mich., the impetus resulting from one week of intensive selling effort still being felt by the gas companies in these two towns. Due to the enthusiasm of Lee Chamberlain, highly successful results were obtained by the Lansing Fuel & Light Co. One of the accompanying illustrations shows the demonstration of Humphrey heaters, which was conducted during the week in front of the company's salesroom. An interested group was gathered about this outdoor exhibit most of the time.

Gas Company and Humphrey Company Salesmen in Campaign at Flint, Mich.

The other illustration shows the order-taking demons, who raked in the water heater business for the Michigan Light Co. at Flint during the same week. The outdoor demonstration also was used in this campaign. A number of automobiles were mobilized and carried large signs featuring the advantages of owning an automatic gas water heater. The campaigns in both of these cities tied up with the national advertising which the Humphrey Co. is conducting so effectively.

Government Endorsement of N. C. G. A. Canning Campaign

"Canning Urged by Houston" says a recent Associated Press dispatch. This is a strong government endorsement of the canning campaign instituted by the N. C. G. A. The secretary brings out several points in making his recommendation, among them being the necessity of preserving the yield of the "back yard gardens" and easing the burden of food transportation by rail so that the public carriers may be used for the haulage of food for military purposes. The N. C. G. A. canning campaign is coming along in great shape and it's up to gas companies to make its adoption universal.

Overland Largest Gas Consumer in United States.

A New York newspaper, in writing about a contract which a certain gas company has made for the delivery of 6,912,000 cu. ft. of gas a month to a corporation, speaks of the contract as calling for the largest supply of artificial gas for a single industrial purpose, ever taken in the United States. The newspaper's assertion was obviously made without knowledge of the contract existing between the Toledo Railways & Light Co. and the Willys-Overland Co. The Toledo Doherty subsidiary has been supplying the Overland people with about 15,000,000 cu. ft. per month for the past three years, and before long the Toledo company will be furnishing between 60,000,000 and 80,000,000 a month to the automobile factory.

Outdoor Demonstration of Automatic Water Heaters at Lansing, Mich.

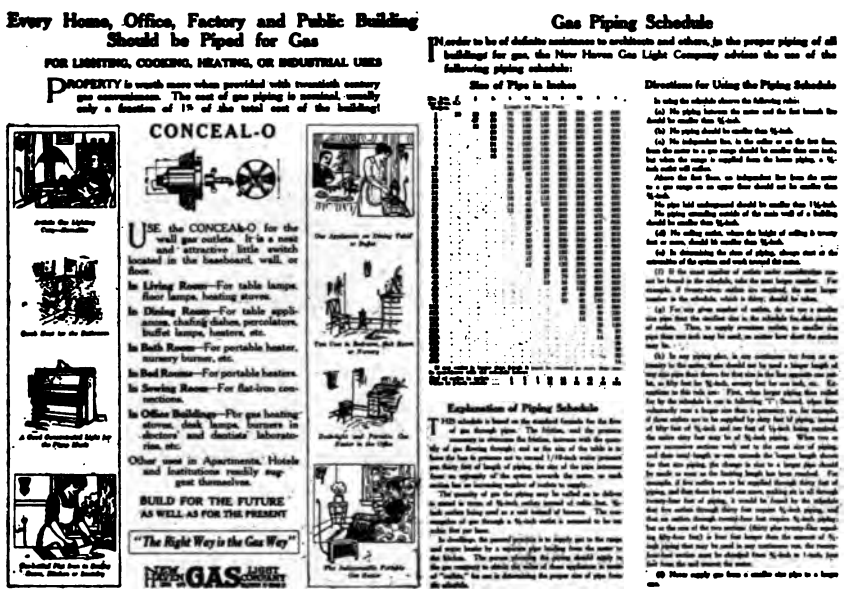
CURRENT ADVERTISING REVIEW

This N. C. G. A. preserving campaign is one of the best patriotic propositions that any industry could boost and we all ought to be proud of the way that the gas field is coming to bat. It affords the finest advertising possibilities imaginable. It gives the gas company a

Chicago Department Store Ad.

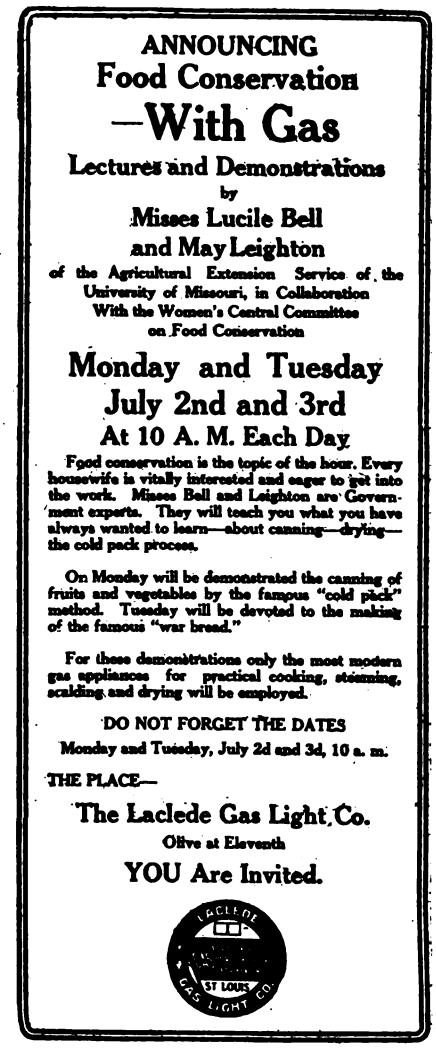
chance to present in its space, the most important news of the day. The company at St. Louis takes advantage of this opportunity by using lively copy like that shown herewith. There is a good chance for gas companies to co-operate with local merchants in running preserving campaign advertising in adjacent spaces. This gives the local newspapers a lever for working in a lot of advertising from department and hardware stores. Most papers will be glad to publish a special page containing a lot of recipes, canning tips, etc., as a lever to move this advertising their way. Take this proposition up with your papers. You can supply them with the N. C. G. A. publicity. The Marshall Field ad., accompanying these lines is a good example of the copy that merchants might use.

Philmer Eves, at New Haven, snatches off the news in the gas field and makes it give his advertising a live, urgent interest. Here is his architects' bulletin headed: "Architects! Home Builders! Property Owners! Pipe Your Buildings for Gas." In the four corners are shown four prominent New Haven buildings that have heeded the advice of the New Haven Gas Light Co. They are the Free Public Library, County Court-House, Pilgrim church and the new Federal building. The copy calls attention to the gas lighting in the wonderful Philadelphia church, the cathedral of SS. Peter and Paul, to the gas piping of the Woolworth building and other points that suggest complete gas piping installations. The inside two pages of the folder are shown here. The folder is architect's standard size.



New Haven (Conn.) Gas Co. Issues Bulletin for Architects.

To be able to put across a house organ that is eagerly read by magazine-bombarded New York is only part of the job that Robert Livingston handles for the New York Consolidated Gas Co. If you want to get an idea of well balanced interest in a business publication look at the July Gas Logic. The front cover has a pretty cook busy with her preserving. The



Food Conservation Campaign.

contents of the paper include, "Deeds of Heroic Americans in Defense of Old Glory," "Revives Jewelers' Art of Ancient Days," "First Principles of Home Canning," "New York Artists' Hotel-Home," and 'Kitchen Magic.." A live editorial page, boosting gas in a manner that hits the conditions surrounding every prospect, several interesting appliance advertisements and other features of definite interest and value to prospective and present consumers of gas, complete the issue.

Canning Campaign

N. C. G. A. Nation Wide Movement Receives Gas Company Approval

Since the National Commercial Gas Association announced its plans for the home canning and preserving campaign in the June Bulletin, it has been literally flooded with inquiries and assurances of support from all sections of the country. At the time of writing (June 5), the association is in receipt of pledges of support from 140 companies who have agreed to take and distribute each month 260,000 canning folders, and 4,000 window posters. These companies have also ordered 35,000 booklets of gummed labels for distribution to their customers. When the gas companies begin to realize the magnitude of this campaign, and the value of the publicity which it will bring to the industry once it gets fully under way, all companies will get in line and give it their fullest support.

Think what the returns in dollars and cents will be to your company if you increase your gas sales, at maximum rates, 25 cents per consumer per month for the next six months. Is this not sufficiently attractive for you to spend a little money and effort to bring it about? The association has prepared a comprehensive plan for your benefit, not its own, and you are requested to contribute your share to make the campaign one of the most talked of features of the nation-wide propaganda for food conservation and preserving.

What Association Offers.

1. A series of six colored posters, 28 inches by 41 inches, one each month and each one different. It is intended that these posters be distributed by the gas company to every grocer, produce dealer and merchant in its town. This may be accomplished by having the poster distributed by the salesmen, who will see that they are hung in the merchants' windows. The salesman will explain to the merchants the object of the plan and request them to replace each poster with the new one as it is received for the new month. The posters may be sent by mail to the merchants with a letter advising them that the gas company will supply a new one each month and asking that they be displayed as suggested.

These posters, if distributed as outlined, will be the main publicity feature of the campaign—but don't expect to get the best results by putting out a few posters here and there—your territory should be literally flooded with them, and you and your dealer will surely get a handsome return on the small investment required.

2. A series of six canning and preserving folders, one for each month, containing ten or twelve well written recipes for canning and preserving the particular fruits or vegetables seasonable for that month. These folders will have a colored illustrated front page, and it is intended that they be delivered to your consumers each month.

Distribute them with your gas bills, by means of your salesmen, at your show rooms, or place them in your windows with a suitable placard inviting the passer-by to come in and take one. They may also be handed out by your demonstrator when she lectures before women's clubs, domestic science classes or other local organizations.

3. A booklet of gummed labels for the glass jars—this will be a 20-page booklet, each page containing 14 or 16 labels for the products which will be preserved during the six months' campaign. These booklets of labels will be much appreciated by the housewife and should be distributed in the same manner as the canning folders.

The above three items are all that the association will make a charge for—it is most essential, however, for the gas companies to advise the association at once as to the total number of posters and folders they will require for each month, as well as the quantity of label booklets they will distribute during the campaign. In placing an order with the printer a close estimate must be made of the total quantity of such literature which will be taken by the companies collectively.

Prices of Literature.

1—Colored window posters, 28 by 41 inches. Each 12c
2—Preserving folders, with colored cover design. Per 1,000..$5.00
3—Preserving gummed label booklets. Per 100 ..... 3.00

Orders should be placed at once with the National Commercial Gas Association, 61 Broadway, New York.

Judson C. Dickerman, general engineer for the Virginia utility commission, visited his old friends at Chicago last week, having been called west to conduct the oral examination of applicants for gas engineer on the Illinois state utility commission, July 5.

UNIFICATION PLANS.

Report of N. C. G. A. and A. G. I. Sub-Committee Ready for Joint Meeting.

Complete plans for the organization of the American Gas Association, which will unite the American Gas Institute and the National Commercial Gas Association and perform all the functions heretofore exercised by these two national gas associations, have been worked out by the sub-committee appointed last February for this purpose at a joint meeting of the public relations committee of the A. G. I. and the N. C. G. A. The report of the sub-committee will be made in the near future to the joint meeting of the two public relations committees, when it is expected the plans for the unification of the two big national bodies into the American Gas Association will be approved and recommended to the respective boards of directors.

It is understood the plans for this unification embrace every provision for making the new association thoroughly democratic in every particular, and that each and every interest in the gas industry in America will have equal rights and privileges in the business of the new organization. The details, including the several articles and sections of the constitution and by-laws, will not be made public until finally adopted by the public relations committees in joint meeting. T. N. McCarter, of New Jersey, is chairman of the N. C. G. A. public relations committee and E. G. Cowdery is chairman of the A. G. I. committee. The sub-committee which framed the plans for the new association consists of P. S. Young, E. N. Wrightington, Frank Freuauff and W. Griffin Gribbel of the N. C. G. A., and J. B. Klump, S. K. Chase, W. Cullen Morris and A. M. Barnes, of the A. G. I. The Natural Gas Association of America is not included in the unification plans.

This big movement, now nearing a successful conclusion, has been one of the principal subjects of THE GAS RECORD's activities for over a year, and the news of its development has been given the industry almost exclusively in this journal.

Harry Firstbrook, formerly with Alabama utilities and more recently at Princeton, Ind., now is with the Iowa Electric Co. at Fairfield, Ia.

Edward A. Turner, former president and one of the founders of the Link Belt Machinery Co., died at Chicago, June 28, aged 67. He is survived by a widow and four daughters.

Automatic Control

Governors vs. Thermovalves for Controlling Temperature of Metal

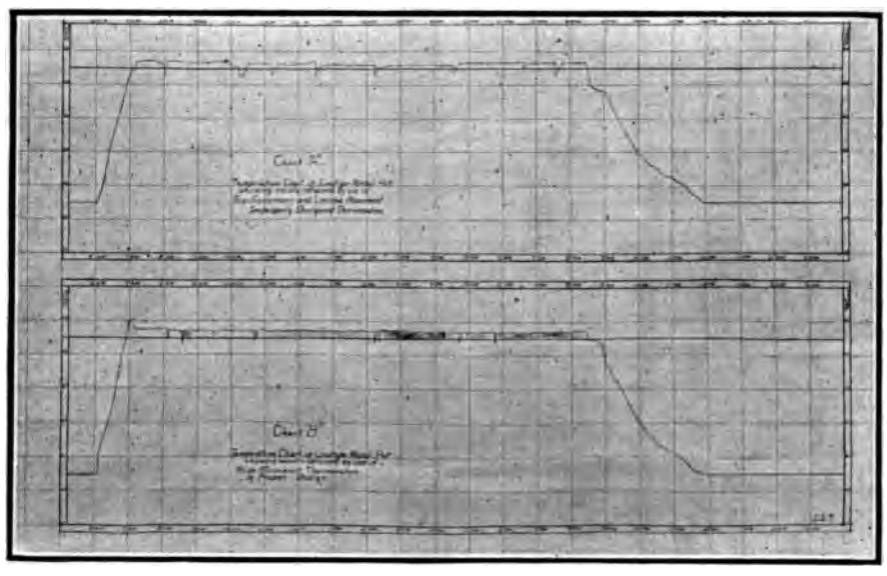
By H. E. Gilbert

It is important that gas fired metal melting pots on all forms of type casting machines be equipped with some form of temperature control, and it is highly desirable that all forms of soft metal furnaces, stereotype, electrotype and remelting pots be likewise equipped. Gas governors, either on the line or on the pot are an advantage beyond question, serving to insure an even pressure of gas under varying service loads or pressure fluctuations in city gas supply lines.

These governors, however, do not accomplish all that is desirable or necessary, since they do not react to compensate for heat losses incident to the adding of metal to replace that removed in the type casting process, the quantity of which varies as the speed of operation or the weight of the type or slug increases or diminishes, nor do they establish the constant factor even under unvarying conditions, that is obtained by means of well designed thermostatic valves.

Many forms of thermostatic valves have been developed, and quite a few of those that have been offered by reason of their design serve a purpose similar to that of a governor, reacting only within narrow limits and having a latitude of movement so small as to be negligible. Such thermostatic valves, while of advantage, do not accomplish all that is desirable in the work, and are being rapidly replaced by the more adequate types of thermovalves of recent development.

Chart A shows results accomplished by gas governors and limited movement thermovalves. At first sight this chart would seem to show results comparing favorably with the results as shown by chart B. In fact, chart B, showing results accomplished by means of the more recent wider movement thermostatic valves would seem to be at a disadvantage as compared with chart A, but an analysis of the two charts brings out clearly certain facts in the work of type casting, and much in favor of the wider movement valve, as represented by chart B.



Two Charts Showing Temperature Controlled by Governors and Thermovalves.

Temperature Lag.

First, the all important fact that the addition of a given amount of cold metal while causing a drop in temperature about equal in both charts, causes a lag of about 15 minutes in the case of chart A. While in chart B this lag is reduced by more than one-half, the advantage of which is plain to any one familiar with the work of type casting, the fact is proved also that should there have been the necessity of adding to the pot additional metal before the expiration of the 15-minute period, the result would have been a lower minimum temperature and an added temperature lag, which could not be compensated and which if repeated at too frequent intervals would put the type casting machine out of service until the temperature balance had been restored. In the case of the wider movement thermostatic valve, as represented by chart B full compensation occurs within less than one-half the time as shown by chart A and permits of repeated additions of metal at frequent intervals without interference with the temperature balance.

Speed of Heating Pot.

Another point of equal value is shown by the time required in each instance to heat the pot from cold. The wider movement valve permits the pot to be heated quicker, with no more danger of cracking and provides a reserve of heat at the starting time when the mouthpiece and mold are at their lowest possible temperature and require the reserve thus provided.

The whole temperature range in either case is well within the working limits of the machines on which the tests were made, and in both cases without any adjustments of any kind, either mouthpiece, burners, pot burners or thermovalves, all measures were cast through a range from 6 point, 7 ems, to 36 point body, 12 point recessed back, and 30 ems wide, with intervals of one or more hours during which the machines were permitted to stand idle. The fluctuations of temperature occurring throughout the day on the pot, as represented by chart B, show the reactions of the thermostatic valve occurring both from the addition of metal to replace that used in the work and from heat lost by radiation when the machine was at rest and no added metal was being melted. These reactions are postive proof of the thermostatic action which do not occur in the case of chart A, because of the very small movement made by the thermostatic valve. In fact, the result, as shown in chart A, would be duplicated by any good pressure governor, with the single exception that with the governor the temperature lag would be somewhat greater and the working latitude of the machine correspondingly less.

Wrong Calibration of Thermometers.

The apparent wide difference in the working temperature, as shown on the two charts, is due to a wrong calibration of the recording thermometers used in the case of chart A. The actual working temperature basis in the case of chart A was about 100 degrees Fahrenheit higher than the chart shows. In either case it would have been possible to set the maximum temperature 10 degrees lower or 10 degrees higher without interfering with the work, since it is not so much the temperature basis that interferes, as it is the temperature fluctuations that oc-

our through very wide ranges on pots not equipped with an adequate means of automatically controlling the temperature.

In this work the lines as between the practical, that gives fair results, and the final, that gives commercially perfect results, are very fine, but nevertheless, important, often representing the difference between success and failure from a business standpoint, since the machines themselves represent a considerable investment. The operating cost per hour or per pound of finished work is high, and unless operated without interruptions are apt to represent a loss to their owners. Since the quality of work is often the deciding factor in competition with others, no man or firm should neglect, either for newspaper or jobbing work, for the sake of the investment of a comparatively small sum, a matter of so great importance as is represented by an adequate means of insuring the uniform temperature of the metal he uses for this purpose.

British Commercial Gas Ass'n Co-operates in War Economy.

The British food controller has received from the British Commercial Gas Association, which represents the leading gas undertakings in that country, an assurance that the gas managers generally will be glad, so far as their depleted staffs permit, to co-operate in the campaign for food economy by all means within their power. The chief items of co-operation suggested are:

(a) Giving to workers who may be engaged in instructing the public on food problems hints on the economical use of gas and the best way to obtain maximum cooking results for minimum consumption of gas—thus combining fuel economy with food economy; (b) distributing "economy" literature to all users of gas cooking apparatus; (c) arranging demonstrations in economical cooking.

The fact that the use of gas in place of crude coal for cooking not only saves precious labor, but also leads to increased supply of high explosives renders the offer of co-operation by the gas industry in the food economy campaign both timely and pertinent.

Free Folders on Canning Distributed at Grand Rapids.

The Grand Rapids (Mich.) Gas Light Co. is issuing folders, giving recipes for canning fruit and vegetables. The Grand Rapids company's employes to the number of 225 also recently shared in the disbursement of a $5,000 dividend for employes.

Small Stoves and Hot Plates Enjoy a Midsummer Boom.

Gas stove and hot plates of the smaller type are making new sales records in many gas companies. The high price of coal, and a seeming tendency of many to remain at home during the summer are held responsible for the boom.

COOKING COSTS.

Results of Experiments Using Five Different Fuels Made Public.

An interesting circular giving the details pertaining to a series of tests made in the laboratory of the department of home economics, Ohio State University, Columbus, to determine the relative cost of natural gas, soft coal, coal oil, gasoline, and electricity for cooking, has been arranged and presented by Samuel S. Wyer, consulting engineer, Columbus.

over the fire was simply allowed to "die out." In burning 67 lbs. 11 oz. Ohio soft coal, 12 lbs. 11 oz. of ashes were left.

Thirty-two meals, each for six people, or the equivalent of 192 services, were prepared from groceries and supplies costing $39.92, or 20.8 cents per person served. Cost data pertaining to one of the typical meals cooked with the five different fuels in this test are shown herewith as well as a comparison of the cost of various fuels required to bake four loaves of white wheat bread.

COMPARISON OF FUELS

IN BAKING FOUR LOAVES WHITE WHEAT BREAD

	Natural Gas at 40c per 1000 cu. ft.	Soft Coal at $6.50 per ton	Coal Oil at 15c per Gallon	Gasoline at 27c per Gallon	Electricity at 3c per K.W. hour
Weight of each loaf before baking	1 lb. 5.5 oz.	1 lb. 5.5 oz.	1 lb. 5.5 oz.	1 lb 5.5 oz.	1 lb. 5.5 oz.
Weight of each loaf after baking	1 lb. 2.75 oz.	1 lb. 2.75 oz.	1 lb. 3 oz.	1 lb. 2.75 oz.	1 lb. 2.75 oz.
Time, in minutes, for pre-heating oven	8	20	20	10	20
Time, in minutes, for baking	45	45	45	45	45
Amount fuel used	10 cu. ft.	6.5 lb.	6.75 oz.	7 oz.	1 K. W hour
Cost of fuel, in cents	0.4	2.1	0.97	1.8	3.
Cost of material in four loaves, in cents	32.	32.	32.	32.	32
Total cost of four loaves, in cents	32.4	34.1	32.97	33.8	35.
Total cost per loaf, in cents	8.1	8.52	8.24	8.45	8.75
Per cent of total cost of four loaves represented by each fuel	1.2%	6.%	3.%	5.3%	8.5%

DINNER FOR SIX

June 7, 1917

	FOOD			FUELS				
	Quantity	Unit Price in Cents	Cost of Dish in Cents	Natural Gas at 40c per 1000 cu ft.	Soft Coal at $6.50 per ton	Coal Oil at 15c per Gallon	Gasoline at 27c per Gallon	Electricity at 3c per K. W. hour
Swiss steak	2 lb.	30.	60.	14 min. top 95 min. oven	19 min. top 60 min. oven	18 min top 85 min. oven	15 min. top 90 min. oven	8 min. top 2 hrs. oven
Escalloped potatoes	2 lb.	8	19.	1 hr.	1 hr	1 hr.	1 hr.	1 hr.
Milk		5		17 min.	8 min.	9 min.	25 min.	40 min.
Spinach (Butter)	1 lb.	10	12	30 "	25 "	45 "	33 "	38 "
Bread—rolls	1 doz.		9.					
Butter	¼ lb.	46.	9					
Rice pudding	¼ lb.	13		1 hr.	2 hrs.	2 hrs.	2 hrs.	2 hrs.
1 quart milk		9.	20	26 min.	18 min.	8 min.	28 min.	20 min.
Coffee—boiled	⅙ cup	30	3 7	14 "	15 "	20 "	15 "	13 "
Cream	⅙ pint	10	10					
Sugar	⅛ lb.	11	1 4					
Total cost of food			144 1					
Quantity fuel for cooking meal				22 cu. ft.	7 lb. 12 5 oz.	2 lb. 5 5 oz.	1 lb. 2 oz.	1 K. W. hours
Cost, in cents, of fuel for cooking meal				88	2 5	5 4	4 6	5
Total meal cost in cents				144 9	146 6	149 5	148 7	149
Cost, in cents, of meal per person served				24 1	24 4	24 9	24 7	24 8
Per cent of total meal cost represented by each fuel				.5%	1.7%	3 6%	3.%	3 3%

Time required to cook with respective fuels

Cost Data

All quantities of food and fuel were actually weighed or measured. After the usual preliminary tests, a number of meals (each sufficient for six people) were cooked on ordinary standard natural gas, soft coal, coal oil, gasoline, and electric ranges. Since the object of the series of tests was primarily to secure data such as would prevail in ordinary kitchen operation, rather than fancy results, none of the ranges were in any way specially prepared for the tests. The natural gas and electricity were measured in meters which were proved for accuracy. The soft coal, coal oil, and gasoline quantities were determined by scale weights. No more fuel was used than necessary to do the specific work, except that in the case of coal after the cooking operation was

Runyan-Ryall Gaset Boosts Civic Interests.

Harry McConnell and his U. G. & E. Bulletin no longer have a monopoly of that fine idea of boosting civic interests with space in the U. G. & E. house organ. The July Gaset, published by the Runyan-Ryall interests, has an article on Allegan, Mich., in which the R-R Co. operates, by Weldon Smith, formerly mayor of the town. Smith was defeated at a recent election, but it's a sure thing that his Gaset story lost him no votes. Judging from the Gaset, the Runyan-Ryall crowd is the most harmonious organization in the whole gas field. Such a spirit of brotherly love prevails that the various factors in the syndicate write poetry about each other.

Naphthalene Stoppages

British Institution of Gas Engineers Publishes Results of Its Investigations of This Problem and Makes Suggestions for Its Practical Elimination

Editor's Note—English gas companies, since the introduction of processes for the extraction of benzol and toluol from coal gas, have experienced considerable difficulty with naphthalene stoppages in plant, main and service pipe. The attention of the Institution of Gas Engineers having been called to this problem, a special committee was appointed by the Institution to conduct a series of investigations. The result of the committee's work is given in the following article which it has prepared, giving methods which it has found effective in obviating such trouble.

During the years 1901-1906, an investigation was carried out by the Southern District Association of Gas Managers of the causes of the trouble experienced from deposition of naphthalene in the mains and services of the gas distribution system, and in the mains and plant on gas works. The work done, taken in conjunction with the work of other investigators, enabled certain conclusions to be arrived at as to the cause of the deposition, and of the means by which this can be prevented. The general conclusions then arrived at, and which have been confirmed by experience since that period, may be shortly summarized as follows: The possibility of naphthalene deposition from the gas depends upon two main factors:

(1) The amount of naphthalene in the gas. (2) The amount of the vapors of the lower boiling constituents of coal-tar (the coal-tar naphthas) simultaneously remaining in the gas, and more particularly, the amount of the vapors of such of these naphtha constituents as have a boiling point approximating to that of naphthalene, namely, those of solvent and heavy naphtha and of carbolic and cresylic acid.

Provided that a sufficient proportion of such vapors to the naphthalene present in the gas is always maintained no trouble is experienced from naphthalene stoppages, even when the amount of naphthalene in the gas is high, for under those conditions when the temperature of the gas is reduced low enough in the services to bring about the separation of naphthalene, a sufficient quantity of the naphtha vapors separates simultaneously to dissolve the naphthalene, yielding a liquid deposit instead of solid crystals. Such liquid deposit, unlike the solid crystals, falls to the siphons with properly laid services, and causes no further trouble. The higher the amount of naphthalene, however, the greater must be the amount of solvent vapors present.

To prevent naphthalene trouble, therefore, it is advisible to effect as complete a removal as practicable of the naphthalene from the gas in the processes of condensing and scrubbing, for although even with a high naphthalene content of the gas trouble may be prevented by the presence of a sufficient amount of vapors, it is obvious that the smaller the amount of naphthalene left in the gas, the lower will be the amount of such vapors which must also be present to prevent trouble. A sufficient proportion of these or other suitable solvents must always be present in the gas sent out into the district. The practical steps to be taken for obviating the trouble are therefore: (1) In the works to arrange to reduce the amount of naphthalene left in the gas to the lowest practicable limit. (2) Addition to the gas before leaving the works of such sufficient amount of suitable solvent vapors as will ensure that any naphthalene remaining in the gas will not separate in the solid state during its subsequent distribution.

Reduction of Naphthalene Content.

The quantity of naphthalene remaining in the gas depends to a very large extent upon efficient cooling in the condensers, more especially during the summer months. In a large number of works the cooling capacity of the condensers is quite insufficient to carry out effective cooling during that period. Condensers which are quite sufficient to deal properly with the maximum make of gas during the winter months may be quite inadequate to the smaller make during the summer, and it is largely to the high naphthalene content of the gas sent out in the warm weather that naphthalene trouble is due, although the actual stoppages may not occur until a much later period. The difficulty in obtaining effective reduction in the summer is accentuated by the fact that the proportion of "summer make" to "winter make" constantly tends to increase. The lack of sufficient condensing power for summer conditions not only causes the retention of a much larger amount of naphthalene in the gas, but has also a very prejudical effect on the complete recovery of the ammonia from the gas, and in addition to aggravating the naphthalene difficulty, also brings about loss of revenue owing to loss of ammonia.

Although by efficient condensation, it is quite practicable to reduce the amount of naphthalene left in the gas very considerably, it is not possible by this means alone to obtain a gas which will be safe from subsequent naphthalene deposition, when such gas is produced in horizontal or inclined retorts, and with a make per ton such as is now commonly the case. With adequate cooling, gas from vertical retorts (in most cases at any rate) gives no trouble from naphthalene deposition, unless the vapors are subsequently extracted.

A further reduction of the naphthalene in gas from horizontal or inclined retorts may be and often is effected, by washing the gas after condensation, with oils capable of absorbing naphthalene. This reduction is obtained by washing it with oils such as green-oil mixed with three to five per cent. of benzene; with paraffin-oil; or with light-coal tar oils; or with carburetted water gas tar. In the last two cases, the effect is a double one, some naphthalene being removed from the gas, and the gas also takes up some additional quantities of naphtha vapors from the oil or tar. In some cases the washing with carburetted water gas tar is carried out on the hot gas before condensation, and in others on the cooled gas after condensation. In both cases it has a beneficial effect, if the carburetted water gas tar has a low naphthalene content and high naphtha content. Owing to the lower quality of carburetted water gas now being generally manufactured, the tar produced in its manufacture frequently contains more naphthalene and less naphthas than previously, which makes

it less effective both as regards the extraction of naphthalene from and the addition of naphtha vapors to the gas. A similar state of things exists with the crude light coal-tar oils, the tendency being for an increasing amount of naphthalene to be present in the oils supplied; this may rise to such an extent as to make its use harmful rather than otherwise. For this purpose the oil should not contain more than about five per cent. of naphthalene, whereas that supplied has sometimes been found to contain as much as 20 per cent.

Increases the Vapor Content.

Coal gas as normally produced always contains vapors of the lower-boiling constituents of coal-tar. Benzene is present in much the largest proportion, toluene being in the proportion usually of one-fourth to one-fifth of the benzene. Smaller proportions of the higher-boiling constituents are present, the amount of each decreasing with increasing boiling point of the liquid. On the other hand the effectiveness of a given amount of each vapor in preventing the deposition of solid naphthalene increases as its boiling point rises, owing to the fact that the gas is more nearly saturated with it. The quantities of benzene and toluene present in the gas are so far below the amount which the gas is capable of taking up that they are of much less importance in this respect than the much smaller quantities of higher boiling constituents, and if benzene and toluene are removed from the gas, this can be compensated for, so far as naphthalene trouble is concerned, by a very much smaller proportion of the vapors of liquids of higher boiling point.

During the past few years a number of different liquids have been used for the purpose of increasing the quantities of solvents in the gas at many works, with a large degree of success. The most commonly used are the following: (*a*) Solvent naphtha and heavy naphtha. ((*b*) Crude heavy naphtha, sold often under trade names. (*c*) The condensed liquid obtained by the compression of oil gas, and containing large amounts of benzene and toluene as well as higher boiling naphthas. (*d*) Light paraffin-oil, such as white spirit. (*e*) Ordinary paraffin burning-oil, or kerosene.

Of the various solvents, apart from questions of price and of ease of obtaining them and of their naphthalene content, it is probable that those derived from coal-tar or carburetted water gas tar are the most efficient for a given quantity, by reason of the fact that their capacity for dissolving naphthalene is the highest, but difficulties as to price, and quantities available, make their employment in many cases difficult. The increasing difficulty of obtaining crude heavy naphthas sufficiently free from naphthalene for the purpose has in many instances prevented their continued use. In the case of the oil-gas condensate, which is only available in limited quantities, the quantity required is much greater, on account of its large content of crude benzene and toluene, but these have the additional value of acting as enrichers.

In the majority of cases, the undertakings which have increased the content of solvents in their distributed gas, have had recourse to paraffin-oil, which although only capable of dissolving a lower percentage of naphthalene than coal-tar naphthas, has the advantage that it is always entirely free from naphthalene, and moreover can be obtained without difficulty in any required quantity at almost any place in the United Kingdom under ordinary conditions.

When paraffin-oil is employed, however, certain altered conditions are necessary in its addition to the gas, on account of its having a much higher boiling point than the coal-tar naphthas. The amount of this oil which can be taken up as true vapor is so low that the amount of such vapor present is insufficient to prevent naphthalene deposition. It is in consequence necessary to introduce the added amount of this solvent to the gas in the form of a mist or fog, in such a fine state of division that the mist particles are carried mechanically with the gas to the extremes of the district of supply. Provided that this condition is fulfilled, this oil is successful in eliminating naphthalene trouble. The most suitable kind of paraffin-oil for the purpose is a light paraffin-oil such as white spirit, as this has a lower average boiling point and a greater proportion of it is taken up as true vapor by the gas, but oil of this character is not so readily available and is more expensive.

During the 10-15 years previous to the outbreak of war in 1914, trouble from naphthalene stoppages had, in general, steadily decreased throughout the country, owing to the adoption of the methods referred to for reducing the amount of naphthalene in the gas on the works and for the addition of suitable solvents to the gas. In many cases, undertakings which had previously been seriously troubled with naphthalene completely got over the difficulty or reduced the number of stoppages to a very small figure. Since the war, however, there has, speaking generally, been a marked increase in the number of complaints, which have in many cases attained serious dimensions, and the difficulty of dealing with these complaints has been much increased owing to the shortage of labor.

This increase arises from several causes. In the first place, there can be little doubt that on the average the quality of coal carbonized during this period has decreased; at the same time the necessity of economizing coal as far as possible and of maintaining the supply of gas has resulted in every effort being made to increase the amount of gas obtained from the coal, and both these factors have had the result of decreasing the amount of solvent vapors normally present in the gas, without artificial addition. In the second place, owing to difficulties arising out of the war, extensions of condensing plant which are urgently required have not been carried out, and the gas in the summer months has often been very insufficiently cooled, with a resulting increase in the amount of naphthalene in the gas. Such increased amount of naphthalene in the gas and reduced amount of solvents have in themselves brought about a very considerable increase in the number of complaints.

In addition to this, however, a further factor in the matter has been, that for the purpose of the war, it has been necessary to remove from the gas a large proportion of its benzene and toluene content. This in itself would not have a very marked effect, as their influence is small compared with that of the vapors of higher boiling substances. Unfortunately, the processes by which the benzene and toluene are removed, simultaneously effect the removal of these higher boiling vapors. The extraction of the benzene and toluene, whether by tar-washing or oil-washing, although it may, and frequently does, reduce the amount of naphthalene in the gas, reduces the quantity of solvents remaining in still greater proportion, which makes the gas more liable than before to deposit naphthalene in spite of the smaller quantity present. Further, if the gas is not properly cooled before the oil or tar washing, or if the oil or tar are too warm, the quantity of naphthalene in the gas may be considerably increased owing to naphthalene being taken up from the tar or oil used.

To ensure freedom from naphthalene trouble, therefore, under present conditions, it is essential that the gas shall contain a certain proportion of suitable solvents, either present as vapors, or as a fine mist carried with the gas to a large extent to the extreme limits of the district of supply. The quantity

of such solvent which must be added for complete prevention depends to some extent on the amount of naphthalene in the gas, and on the nature of the solvent, but generally it is found that the addition of a quantity of solvent of from 10 to 15 gallons per million cubic feet, in addition to that normally present, is sufficient to ensure freedom from trouble; provided that the mains and services have not old deposits of naphthalene lying in them. Where the benzene, toluene, etc., have been washed out of the gas, a slightly higher additional quantity may in some cases be necessary.

A number of undertakings, which had in past years been greatly troubled with naphthalene, but which had overcome this trouble previous to the war by addition of solvents, and have continued this procedure since, have had no appreciable difficulty from deposits during the past three years, in spite of their having carried out tar-washing or oil-washing during that time.

Where the mains of an undertaking contain old deposits of naphthalene, as is very frequently the case (and in these mains considerable deposits can exist without causing any noticeable diminution in the capacity of the mains to pass gas), it is much more difficult to obtain any immediate remedy. Though the gas may be sent out from the works in such cases with a low naphthalene content and sufficient solvents to prevent any of this naphthalene from crystallizing out, naphthalene stoppages in the service pipes will still tend to continue, as the gas passing over the naphthalene lying in the mains gets its content increased. When the gas thus enriched with naphthalene reaches the cooler service pipes, the proportion of solvents is no longer sufficient to prevent the separation of solid naphthalene, and this state of things will continue to a greater or less extent until the whole of these old deposits has been cleared out of the mains. If these are extensive, a considerable length of time is required to effect this. Where such deposits exist (which may be shown indirectly by determining the amount of naphthalene in the gas leaving the works and in the district some distance away, when it is often found that the naphthalene content has more than doubled) no ameliorative measures affect the immediate cessation of the trouble, which only gradually ceases during a period which may extend over many months, where the quantity of old naphthalene deposits is large; but once this has been cleared, no recurrence of the trouble occurs so long as a sufficient proportion of solvents is continuously maintained. To cease adding solvent when there is no trouble in the district is in the long run a false economy.

When trouble is experienced owing to the picking up of naphthalene from old deposits, appreciable relief, though not complete cessation, is obtained by considerably increasing the quantity of naphtha vapours added to the gas for a time, which remedy, though expensive, is often less costly than the direct and indirect losses due to the naphtha lene stoppages. Where the trouble is bad in one particular district much relief has been obtained in some instances by locally spraying or evaporating naphtha into the mains.

Where a portion of the gas supplied consists of carburetted water gas this tends to increase the amount of solvent vapours in the gas as carburetted water gas usually contains a higher proportion of solvents than coal-gas of the same quality. Owing, however, to the fact that the quality of carburetted water gas made is now on the average lower than formerly, the amount of solvents in it has decreased, and addition of such gas alone is often insufficient to supply the necessary amount of solvents unless the proportion of this gas is high.

Methods of Adding Solvents to Gas.

There are two general methods adopted for the addition of the necessary solvents to the gas (1) by spraying and (2) by evaporation. A number of different forms of spray producer are on the market, in some of which the spray is produced by means of compressed gas, and in others by pumping the liquid itself under high pressure through the spray producer, as in the Korting jet, the spray being injected into the gas main at a suitable point. In both cases, especially where paraffin-oil is used, which is to a large extent not vaporized into the gas, but remains as a fine mist, care must be taken to see that the jet is kept in good order and steadily produces a spray of exceeding fineness, as if this is too coarse it will not be carried along with the gas sufficiently far. Further, immediately after the gas is sprayed care must be taken that the gas should not pass round sharp bends or meet other obstructions which tend to strip out the mist, and it is further advisable to make tests in different parts of the district to ascertain if the mist is being carried sufficiently far. This is most readily done by allowing a sharp stream of gas from a small jet to impinge on a piece of dry slate, the paraffin mist, if present, depositing as an easily recognizable oily film on the slate.

Evaporation may be readily carried out by means of one of the several suitable surface-vaporizers on the market. These consist essentially of a large surface of plate heated by steam, over which the solvent used is allowed to flow. A portion of the gas stream to be enriched, amounting to about ten per cent. of the whole, is by-passed and made to flow over the heated surface of the solvent, which at that temperature evaporates into the gas; where paraffin-oil is used a small proportion of the highest boiling constituents does not evaporate, and flows out of the vaporizer. The hot by-passed stream of gas, laden with the solvent vapours, is then led back to the gas main, where it mixes with the main stream of gas. It is advisable that the admixture of the streams of hot and cold gas should take place as rapidly as possible, especially in the case of the use of paraffin, for the fineness of the mist produced depends to a large extent on the rapidity of the cooling to which the hot stream is subjected. This by-passed stream should not be introduced into the top or side of the main carrying the main stream, but should be carried by an internal bend into the center of the gas main.

Where To Add Solvents.

The addition of solvents may be made either between the station meter and the holder, or to the gas as it goes out to the district. Practice in this respect differs at works which are using the method with complete success, the one method being adopted at some and the second at others. The addition of the solvents at the holder inlet has the advantage that the gas to be treated remains approximately constant throughout the 24 hours, and consequently the amount of solvent used can be fixed also at a uniform rate, and only requires adjusting when the daily output of gas is altered. It has the further advantage that the deposition of naphthalene at the holder inlets and outlets (a very favorite place for its separation) is prevented, which is not the case if the treatment is carried out beyond the holder outlet.

The addition of the solvents on the holder outlets has the disadvantage that the rate of output varies greatly during the 24 hours, and consequently the rate of solvent added has to be constantly varied. Where there are several governors supplying different districts, if the gas is to be treated in a single stream, this must be done before the governors, and the gas after treatment is "wire-drawn" in passing through the latter, which tends to strip out any solvent in the form of mist.

Both methods, as stated, are in successful use in practice, and no definite evidence is available as to which of the two plans is the better.

Ammonia Sulphate

Data on World's Production in 1915-16 Issued by Barrett Co., New York

The status of the sulphate of ammonia industry, in common with most other industries, has been affected by the abnormal conditions consequent to the war, says a recent publication on "Production of Sulphate of Ammonia for 1915-1916," issued by the Barrett Co. The uniform increase in the production and consumption of sulphate of ammonia in the different countries has been disturbed and we find no precedent for the situation that now confronts us. In the early months of the war the iron and steel business encountered dull times, and therefore the production of ammonia was somewhat reduced. Now, however, the pendulum has swung in the opposite direction. The unusual demand for iron and steel in modern warfare has increased the requirements for coke in manufacturing. This, together, with the lavish use of high explosives, which are in part derived from ammonia, benzol and toluol, all by-products of modern coke making, has greatly stimulated ammonia production. Requirements have more than kept pace with the supply, however.

In the United States the urgent need for larger crops to feed our allies as well as ourselves has brought about a heavy additional demand for fertilizers, especially those supplying nitrogen. In the case of Germany, however, another factor has come into play, namely, her commercial isolation, and the necessity of producing her own supply of combined nitrogen for both fertilizer and explosive use, much of which she was previously able to import; in fact, it is not too much to say that the present world requirements for combined nitrogen exceed anything in history.

Statistics of an accurate character are difficult to obtain. None are available from Belgium, and the figures for Germany and Austria can only be considered as unofficial estimates, whose dimensions are surprising. Figures for the world's production are given in the accompanying table, though the lack of various items makes it necessary to omit totals.

Sources of Production.

The great source of ammonia in the future as in the past seems to lie in the distillation of bituminous coal. The increased quantities available are as yet scarcely realized by the ordinary observer, including, as they do, the nitrogen inmost of the coal now consumed for fuel. The truth of this statement is apparent from the gains already being made in this direction, that is, the increasing amount of coke now made and used for ordinary fuel purposes, and recent progress in the recovery gas producer.

The progress of the by-product coke oven in the past twenty years has at times seemed slow, especially in the United States, the largest coke producer. The proportion of the total United States coke production now made with by-product recovery scarcely exceeds one-third. It must be remembered, however, that the construction of recovery plants involves a heavy initial investment, and that the change from "beehive" form once made is permanent. These plants are therefore necessarily in strong hands and there is every reason to expect that they will be operated regularly on a sound financial basis. Furthermore, ammonia as well as gas, tar and benzol, are only by-products of coal, in fact, as in name. All are practically organic parts of the steel industry, and are produced in accord with the demand for steel, rather than their own market conditions.

We may well expect an increase in the amount of ammonia obtained by the cyanamid process, or the Haber synthetic process, but these methods seem to require specially favorable conditions of one kind or another for the commercial survival, such as low-priced power or proximity to other chemical works. Aside from the stimulus due to war conditions and requirements, the increase in the number of cyanamid factories has been very gradual, especially when compared with the growth of the by-product coke oven and the coal gas works.

A certain amount of ammonia is recovered in England from shale distillation, and from blast furnaces in Scotland using splint coal. Some is also derived from the treatment of peat.

A new process for the fixation of atmospheric nitrogen, which produces sodium cyanide, and on further treatment, ammonia, has been put forward by Prof. John E. Bucher. Coke, sodium, carbonate and iron borings are raised to a red heat in an atmosphere of nitrogen or producer gas, and sodium cyanide is formed. By boiling with caustic soda, ammonia is readily obtained. While only in the experimental stage as yet, it is understood that an operating plant is being erected, and a nitrogenous product of some character will be placed on the market before long. Research on these lines has been much stimulated and numerous other processes for nitrogen fixation have been brought to notice.

From a commercial point of view, the years 1915 and 1916 have displayed a practically continuous rise in price, to heights that have not been reached for many years. From the beginning of 1915, when the English export quotation was around £12 19s 3d, the progress was almost continuously upwards, and while the first half of 1916 showed a halt on a somewhat lower level, the latter half moved upwards to new high figures. The English figures

WORLD'S SULPHATE OF AMMONIA PRODUCTION.
(In metric tons of 2,204.6 lbs.)

Country	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916
England	294,170	318,400	330,450	354,747	373,590	391,160	394,540	439,565	433,259	433,011	445,033
Germany	235,000	287,000	313,000	330,000	373,000	418,000	492,000	548,558	.....	.....	.....
United States	68,000	90,120	79,500	96,600	105,143	115,245	149,700	176,900	166,016	226,834	294,838
† France	49,100	52,700	52,600	53,600	56,000	60,000	68,500	74,500	.....	42,000	25,000
† Belgium and Holland	30,000	*55,000	§35,000	§40,000	§43,000	§43,000	§55,800	§53,600	5,000	5,000	4,000
† Spain	10,000	‡12,000	.....	12,000	9,000		§9,000	§15,000	15,000	15,000	16,000
† Italy	5,000	11,000	§80,000	12,000	12,000	§166,500	§15,000	§15,000	14,323	15,000	.....
† Other Countries	40,000	65,000	.....	§73,000	§79,000		¶68,800	¶86,100	.....	.....	.....
Total	731,270	891,200	890,550	971,947	1,050,733	1,193,905	1,253,340	1,409,223			

* Including Norway, Sweden and Denmark.
† Estimates from l'Engrais.
‡ Including Portugal.
§ Estimates from Deutsche Ammoniak-Verkaufs-Vereinigung, 1908-9-10-11-12-13.
¶ Estimated.

do not, however, as in former years, correspond to the world's supply and demand, because of the control exerted over exports by the British government. At the same time lower prices have been prescribed for home agriculture than for export. This has increased home consumption, though probably not as much as was hoped for.

The United States.

In the United States it would appear that the long expected swing toward the by-product coke oven was at last taking place. The production for 1916 is estimated at 325,000 tons, an increase of 75,000 tons over the figures for the year 1915, or 30 per cent. Of this production, 272,000 tons are credited to the coke ovens and 53,000 tons to the gas works and bone carbonizing plants. The corresponding figures for 1915 were 197,128 tons for the coke-oven plants and 51,921 tons for the gas works, a total of 249,049 net tons, these data having been recently given out by the United States Geological Survey. To this amount should be added 1,000 tons estimated for the recovery of sulphate of ammonia from bone carbonization, etc., so that the total figure for the year 1915 would be 250,049 net tons, reckoning all forms as sulphate.

The increase of 75,000 tons output in a year is a notable one, but it is scarcely larger than Germany recorded in 1912, when the coke-making industry of that country was being transformed from a non-recovery to a recovery basis. It is along this road that the iron producers of this country are apparently destined to travel, and because the industry is so large, the distance still to go is considerable.

The total coke production in 1916 was a record breaker, both for beehive and by-product ovens, amounting to over 54,000,000 tons. This corresponds to about 82,300,000 tons of coal, and taken together with the gas works carbonization, some 4,700,000 tons, we may place the coal carbonized at 87,000,000 tons for the year. This should have yielded 870,000 tons of sulphate of ammonia, if treated in by-product ovens, in place of 325,000 tons, the estimated recovery. In other words, only 37 per cent. of the possible recovery is being effected.

If we base the production on coke produced rather than on coal carbonized, we may take the total coke from all sources in 1916 at about 57,270,000 tons, and that from recovery ovens and gas works at 22,100,000 tons. The by-product coke is then 38.6 per cent. of the total. It is interesting to note that the beehive coke production was, as has been stated, the largest in the history of the country. It was achieved by working the operating plants full time and by lighting up idle ones, rather than by building new ovens. At the end of 1916 there were only 104 new beehives reported under construction, which is the smallest number yet recorded. In by-product ovens, on the other hand, there were in 1916, 6,756 ovens completed and in operation, in 44 plants, and 2,236 ovens, comprising 17 new plants and additions to existing plants, under construction.

COAL ENOUGH.

Official Figures for Six Months Reassuring To Coal Users

Not only food but fuel is a vital need of this country and of our allies—coal to run the ships and railroads, to feed the iron furnaces and furnish steam for all the manufacturing plants, coal in greater quantities than have ever before been mined in the United States or in any part of the world—and this need is being met in truly American fashion by the operators and owners of the mines and by the diggers of coal. With these words, Secretary Franklin K. Lane began his statement regarding the coal situation as reported to him by the statisticians of his department.

The production of coal in the United States last year, he continued, was the greatest in the history of the country, A new record, however, was set for the first six months of this year, fully 270,000,000 tons of bituminous coal being produced since January 1st, thus exceeding the output of the first six months of last year by about 20,000,000 tons. Even better news is that the limit has not yet been reached, for as the railroads are able to work out to better advantage the problem of car supply and give to the mines greater facilities for transporting their poduct to market, the supply of coal that reaches the consumer will be in steadily increasing quantities. In the early months of 1917, because of the congestion of the railroads and the difficulties of transportation, the production of bituminous coal fell behind the high mark set in January and February, a year ago. As a result of the patriotic and earnest endeavor of the railroad officials and the coal operators and representatives of mine workers who have volunteered their services to the federal government in this emergency, production has been speeded up within the last few months and the output of soft coal which in May exceeded all previous records, was surpassed in June.

Despite the extra demand in this country and the urgent needs of our allies, no one with the facts before him can doubt that the coal industry, under the careful guidance of those now directing its welfare, will be able to supply all needs. The difficulty of distribution now so great will be intensified, however, in the coming winter months. Just as consumers of foodstuffs are being urged to eliminate all waste and to practice sensible economy, so the consumers of coal must do their share in working out the coal problem by unloading every coal car as fast as it is received, and in improving their plants so as to utilize to the fullest the heat value of the coal that reaches their bins. In stopping the coal panic and in expediting a condition of fuel sufficiency, every consumer can do his bit.

THE MARKETS.

Supplies Continue High and Hard To Get—Quotations on By-Products.

With practically all manufacturers out of the market, iron and steel pipe continues to be quoted at a wide range. Mills in position to ship before the latter part of this year sell at maximum quotations and above. Mills which have made no recent changes in prices have not been active factors in the market for 60 days. A. M. Byers Co. and Reading Iron Co., June 30, issued revised cards showing advances of from $10 to $14 a ton on standard wrought iron pipe. Advances on wrought iron pipe have been expected since June 18, when independent manufacturers of steel tubular goods put up quotations irregularly from $14 to $26 a ton. Cast iron pipe men are working on the plans for the army cantonments to be located at Yaphank, L. I., and Wrightstown, N. J., and some estimate of the amount of pipe required is expected within the next week or two. It is understood additional tonnage is to be purchased for the cantonment at Ayer, Mass. The market generally continues at $65.50, New York, for 6-inch class B and $68.50 for 4-inch class B.

Toluol, Benzol, Phenol and Other By-Products.

Toluol continues to be quoted at $1.75 to $2 for spot and at $1.50 to $1.75 for contract. Benzol and phenol, the other two by-products whose chief use under present conditions is for conversion into high explosives, have been quiet pending the establishment of new purchasing arrangements for the allies in this country. Pure benzol is quoted at 55 to 60 cents per gallon, spot and contract, while phenol continues to be quoted at 38 to 40 cents both for spot and contract shipment. Solvent naphtha is unchanged at 18 to 25 cents per gallon, for spot, and at 18 to 22 cents for contract. Sulphate of ammonia is quoted at $4.85 to $5 per 100 pounds, at seaboard, for spot and at $4.40 to $4.50 for contract.

Sale of Pipe More Profitable Than Sale of Gas.

The Fuel Gas Co. of Indiana, is asking the commission for permission to sell its pipelines and discontinue supplying gas to the citizens of Hope, Ind. The supply of natural gas is diminishing and the sale price of pipe is ascending so rapidly that the company wishes to sell its pipe.

Coal Prices Greatly Reduced

Important Results of Interest to the Gas Industry Are Secured Through Co-operation of Coal Operators and United States Government Officials

As a result of a conference between the mine operators, Secretary of the Interior Franklin K. Lane, Federal Trade Commissioner Fort, Chairman F. S. Peabody and the committee on coal production of the Council of National Defense, the following reductions were made effective July 1 in the prices of coal. This, according to the statement of Director George Otis Smith, of the Geological Survey of the Interior Department, will effect a reduction to consumers east of the Mississippi river of $15,000,000 a month, based on the output of free coal in May of this year. These prices are maximum prices per ton of 2,000 pounds aboard the cars at mine, pending further investigation. These prices do not affect in any way contracts in existence or sales of coal for foreign or export trade. The operators tendered to the government a reduction from these reduced prices of 50 cents per ton for coal that the government may need. No action was taken upon anthracite prices because of the fact that these prices had already been acted upon by the Federal Trade Commission.

Twenty-five cents per net ton was fixed as the maximum price for coal jobbers' commission, with only one commission, no matter how many jobbers' hands the coal may pass through.

On account of an inadequate representation of operators west of the Mississippi river, no maximum prices were fixed for coal from those districts, but a supplementary statement will be issued soon covering prices on coal produced in those districts. The action taken at this conference brings about the following results:

Present prices on bituminous coal mined in Pennsylvania have ranged from $4.75 to $6.00. Under the ruling the price is reduced to $3.00 for mine run and $3.50 for domestic lump, egg and nut.

The present range of prices in West Virginia is from $4.50 to $6.00; price reduced to $3.00 for mine run and $3.50 for domestic lump, egg and nut.

The range of prices for Ohio coal has been from $4.50 to $5.00; prices reduced to: No. 8 district, the thick vein Hocking and Cambridge districts, $3.00 for mine run and $3.50 for domestic lump, egg and nut; thin vein Hocking, Pomeroy, Crooksville, Coshocton, Columbiana County, Tuscarawas County, Amsterdam-Bergholz District, $3.25 for mine run and $3.50 for domestic lump, egg and nut; the Massillon and Palmyra districts and Jackson County, $3.50 for all grades of coal.

The prevailing prices in Alabama have been from $5.50 to $5.75. Prices reduced to: Cahaba and Black Creek, $4.00; Pratt, Jaeger and Corona, $3.50; Big Seam, $3.00 for all grades.

The prevailing prices for coal mined in Maryland have been from $5.75 to $6.00; reduced prices will be $3.00 for mine run and $3.50 for domestic lump egg and nut.

The prevailing prices on coal mined in Virginia have been $4.50 to $5.00; reduced price, $3.00 for mine run and $3.50 for lump, egg and nut.

The prevailing prices on coal mined in Kentucky have been from $4.00 to $4.50; reduced price, $3.00 for mine run and $3.50 for the domestic sizes.

The prevailing prices on coal mined in Illinois and Indiana have been from $3.50 to $4.00; reduced price, $2.75 for mine run and steam sizes and $3.50 for screened domestic sizes.

The prevailing prices on coal mined in Tennessee have been from $4.50 to $5.00; reduced price, $3.50 for all sizes.

At the conclusion of the conference Secretary Lane said: "Gentlemen: This is a very novel proceeding. I think I am within the fact when I say that no such hearing or gathering as this has ever been held in the United States before, or perhaps in the world. You are, I hope, pioneers in a good movement. I come from the land of pioneers, the far Western country, where we look back with respect and admiration and some reverence upon those who crossed the hard and stony and waterless places to the richer spots beyond. And I hope that you will be looked back upon, not only by those who succeed you in the coal business, but by the industries of the United States, with respect and admiration for the manner in which you have acted at this conference. You have responded as men should, to a call made upon you in the name of the people of the United States. You are not a removed class. You are of us. You belong to the people. Most of you are men who were not born to wealth. You come up out of the soil, like the rest of us, and you have shown a sympathy and an understanding of your relations with the people from which you spring. That is the essential quality in democracy. Unless we can maintain in our minds always a consciousness of the source of power in this country, democracy is a failure. There is a strong contention made that this government cannot so organize itself as to meet to the full the demands that are and are to be made upon it, that other forms of government in times of stress, or, in fact, in any times, are more competent and more efficient, because there is the strong hand of the government above, threatening, menacing, compelling. If we in the United States are to work out our problem economic, social, as we have worked out our problem political, we must work it out in my judgment in the spirit in which you have worked—with sympathy, with recognition of those whom you serve. There is a kind of corporation in this country that we know as a public utility. A public utility is one that is at the service of any one, and must render him the kind of service that it holds out to give. In the biggest and broadest sense, each one of you in running a coal mine is managing a public utility, because the public is dependent upon you. And this world is going forward and not backward, it is going to keep its confidence in democracy, if the men who have the management of industry and the men who give direction to the thought of the country have in their hearts always the welfare of the people. The one thing that will turn us back is the exercise of arbitrary power by those who have power and who exercise it ruthlessly. You have been up against an extremely odd situation. And now you have gathered here and met that situation in man fashion. I think you have reason to be proud of what you have done. Speaking for Governor Fort and for Mr. Peabody and his committee and for myself, we are proud of what you have done. You have said to the American people, that within your power, exercising your judgment, protecting yourselves, you will not be oblivious to the rights of those whom you serve; you will, within your power, protect them. That is the spirit that makes for the success of our country. And if all the industries of the United States will have that same spirit, there will be no question as to our ability to mobilize the resources of this country and carry this war to a successful conclusion. Good sense, common sense, vision, the judgment of large minded men—those are

the things that must characterize us if we are to carry on this great venture. We must not work singly and alone, for selfish ends, in the hope of reaping rich rewards, which will distinguish us merely as men who are in industry as makers of money. We must work as the men that the papers said landed in Europe yesterday will work. We must work in companies, in battalions, in regiments, and we must have in our minds the purpose that we are going to march forward to victory, victory not for ourselves, but victory for the country this is dearer to us than anything we have except our own families. This war is not a war of a day. It is not a war upon which we entered lightly. It is not a war in which any man, no matter how old he is, no matter what his resources may be, will not be compelled to play his part. We are the greatest business nation on earth, and, therefore, we must look to the business men of the country to lead our people in spirit. And I think that the word that comes out from this gathering will be an inspiration to the people of the country."

Secretary of War Baker, temporarily has caused some uneasiness since Mr. Lane and the coal operators reached their agreement by declaring that his familiarity with the progress of the federal trade commission in its investigation of the cost of coal production leads him to believe the $3 price is much too high. It is thought that matters will be satisfactorily adjusted, however, within the current week.

U. S. Now Produces Increased Coal-Tar Dyestuff.

The U. S. Bureau of Foreign and Domestic Commerce reports that whereas but seven concerns were engaged in the coal-tar dyestuffs industry in this country in 1914, there now are some 150. American plants made about 6,500,000 lbs. of coal-tar colors in 1914, they now are producing around 20,000,000 lbs. a year.

Little Falls (Minn.) Gas Co. Retires From Business.

J. J. Goltz, trustee, writes us from Little Falls, Minn., that the Little Falls Darling Gas Co. is in bankruptcy and out of business.

Data for Your Handbook

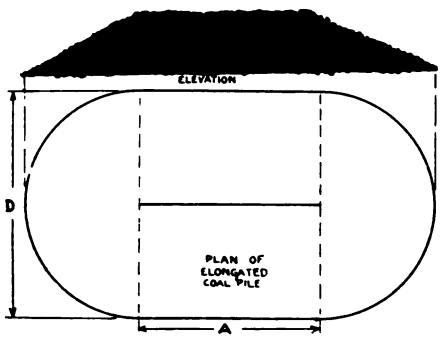
Method for Approximating Tons of Coal in Elongated Piles.

(Copyright, 1917, by W. F. Schaphorst.)

When bituminous coal is piled in a conical pile the tonnage is easily estimated from the formula $0.00248D^3$ where D is the diameter of the pile in feet at its base. But coal is often stored in elongated piles similar to the sketch herewith, in which case the tonnage of bituminous coal is computed from the formula.

$0.00248D^3 + 0.00474AD^2 =$ Tons of bituminous

Where A is the length of the "crest"



Plan and Elevation of Coal Pile.

on the pile in feet. The best way to determine the length of this crest is to subtract D from the total length of the pile at its base.

The sketch shows one of these piles, both in elevation and in plan. The plan shows clearly how the pile can be divided into three parts. The two curved end portions, when added together give a simple cone, whence we have the $0.00248D^3$ in the formula. The central portion has a triangular section from end to end, and its volume is one-half as great as would be the volume of a rectangular block having the same base and height. The tonnage in this central triangular portion is $0.00474AD^2$. Adding the two together we obtain the total tonnage in the pile.

Where the coal is anthracite instead of bituminous the formula becomes:

$0.00172D^3 + 0.0033AD^2 =$ Tons of anthracite.

D and A are both measured in feet.

These formulas are based on the fact that one ton of coal occupies 38 cu. ft. on the average, whether anthracite or bituminous. The natural cone of anthracite is 0.25 as high as it is in diameter at its base. For bituminous coal the value is 0.36.

How Much Do You Pay For the Water on Coal?

(Copyright, 1917, by W. F. Schaphorst.)

Having no figures before me on the subject, "Weight of Wetted Coal," and being unable to find any in my textbooks or handbooks, the thought strikes me that the subject should be discussed. It is common practice for coal dealers to "wet down" the coal they sell, for the purpose of laying the dust. We all agree that the dust is a nuisance and should be eliminated, but it costs like fury to pay for water at the price of coal. Water is rather "heavy stuff." It takes but 32 cubic feet of it to make a ton. And at the present high cost of coal, and its trend upward, the cost of water is, therefore, going up also.

I don't know how much water will cling to a ton of coal. Ten pounds might be the limit with smooth, hard, large lump anthracite. Anthracite, however, doesn't need wetting so much as bituminous and the softer coals. Fine soft coal will doubtless absorb 100 pounds of water per ton. Coal dust will perhaps absorb its own weight in water. For example, let us assume that after being wetted down, a ton of coal, as sold, is actually 1,900 pounds coal and 100 pounds water, and that the dealer's price is $4 per ton. What is the actual price per ton?

The method of computing this can be put in the form of a formula:

$$\frac{2,000}{2,000 - W} \times P = A$$

Where A=actual price per ton; W=weight of water per 2,000 pounds; P=price per ton, dealer's.

Substitute in this formula and you will find the actual price in the above problem to be $4.21 per ton.

That, however, isn't all. There is another loss—the cost of evaporating the 100 pounds of water in the furnace. Although not so great, it is a loss that is worth considering where much coal is purchased.

In direct contact with the flames, with no intermediate iron shell to diminish efficiency, a pound of coal should evaporate at least 10 pounds of water. Ten pounds of coal would, therefore, be required to evaporate the above 100 pounds of water, which leaves us but 1,890 pounds of "effective coal" per 2,000 pounds. Substituting in the above formula again we get $4.23 as the actual cost per ton. Considering this loss in addition to the first loss the formula becomes

$$\frac{2,000}{2,000 - 1.1\,W} \times P = A$$

Although 23 cents per ton may not sound like much, it represents a great deal more when hundreds and thousands of tons are sold. Selling 100 tons per day the coal dealer can thus easily make $23 on "watered stock." Doesn't it seem as though this "water proposition" is worth thinking about?

Business As Usual

By Harry Gale Nye

It was the Poet Bryant's idea, you remember, that a man should so live that when the village doctor had done his worst, he would be ready to run along, not like the helper, overworked but as blithe as a man starting off to the annual gas company's picnic at Gooseneck Park.

That is the way it looks to a lot of us about this war. If a man with a business will just live each business day, making the most of it and the best

H. G. Nye, Chicago.

of it, he needn't worry much about something that is going to happen, or may happen, and probably never will happen, sometime in the funereal future.

While a certain amount of forehandedness is all right, there is no good thing that can't be overdone. Some fellows have their sights set so high that they are always shooting at marks a mile off, and likely to walk into a bear-trap.

When the present little international game in which we recently called for a hand began three years ago, the sign went up in England, "Business as usual." It sounded well, but it didn't work out. Business can't be usual under unusual conditions. You can't expect a man to buy stock in a roof garden during the Zeppelin season. But there is no use scaring him into a cellar either.

There are a whole lot of people who believe that the thing to do is to adjust yourself to each day's conditions, with a reasonable eye to the future, and then go ahead. That is what a lot of us think is a good thing for the man in the office, the shop and on the road to do now.

In other words, so live that when things get better or worse, dull or busy, you haven't been overlooking any bets as you went along. There are a hundred million people in the United States, and they are not going to tear out their pipes and shut off their gas just because we are taking a war census in this country or bringing the Kaiser to his.

We are going to try economy but we are not going to get extravagant with it. Right now you may see some symptoms of a tightening up of trade. Economy is the latest thing, and like the ukelele, everybody is practicing it. Wives are trying to think up new ways their husbands can save money.

But it isn't going to be very long before we get adjusted to the war idea. We have floated a two billion dollar loan, and the beauty of it is that the money is going to be blown right here on the premises. We have simply borrowed it from ourselves to lend it to our friends, with the understanding that they are to spend it before they go out. We have loaned the money and taken it back, with the understanding that later it must be paid back again, and with interest as we go along.

So we needn't worry about the money end of it. We may hate to send our boys across the pond to stop the row. But we have said we will do it, and so we probably will. We are going to make the world safe for democracy. Just the other day I heard a good old southerner declare:

"Yes, sah, we all are a-goun' to make the world so safe foh democracy sah, that they won't be a Republican in the white house for anothah fohty yars"

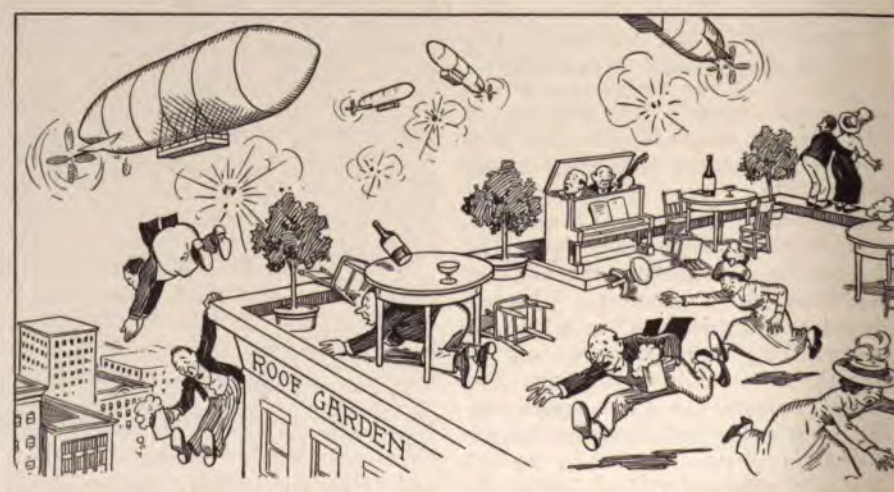
He hadn't just caught the idea, and he had mixed up the democracy that the President has been talking about with his county organization down in Alabam', but he shows the spirit of the times and of the country. And when the boys in khaki and the general public have their heads up, it is

Wives Are Trying to Think of New Ways Their Husbands Can Save Money.

no time for the business man, little or big, to have his head down.

Let's go ahead with business just the same as if nothing had happened or is going to happen. Let us so live that when something does happen, if it ever does, it will be found that we have not overlooked any business bets just because it might.

There is something going to happen



You Can't Expect a Man to Buy Stock in a Roof Garden During the Zeppelin Season.

all right, but it isn't going to **happen to us.** If we could tell fortunes, and were allowed to read the palm of a certain person now resident in Berlin, we would tell him that his path is about to be crossed by a tall gentleman in red and white striped pants and wearing a beaver hat and a chin whisker of the vintage of 1870.

It isn't going to be any whist party or croquet match, and both sides concerned are going to know they have been in a fight. But we have confidence in the ultimate result, because Ultimate Result is Uncle Sam's middle name. We have confidence in the boys in khaki who are going across to put it across. So, if there is any confidence lacking, it is in ourselves.

Let us so live that when Johnny comes marching home again he will find no leaks in our mains and our business holder up!

The Money Is to Be Blown Right Here On the Premises.

Utilities Must Hold Down Demands for Labor and Capital.

In an article' "War's Effect on Public Utilities" in the Stone & Webster Journal, Henry G. Bradlee declared that we may have for the first time in our experience, and continuing during the entire period of the war, a combination of conditions somewhat as follows:

First: An unprecedented shortage of labor, materials, and supplies, and consequently an abnormally high price for those actually available.

Second: No new capital available for extensions and additions to property.

Third: A condition of general industrial activity and prosperity with consequent demands for additional service.

It is hard to imagine a more difficult combination of circumstances for a public utility, and it will require the combined ingenuity of the utilities to meet this situation successfully and furnish satisfactory service to the public. The utilities must devise ways and means to hold down their demands for labor and capital, and above all, they must, if possible, find some way to provide for increases in business without making any material increase in plant. The best methods to be adopted and the changes to be made to secure these results are by no means clear, and can be worked out only after careful study of each local situation.

ADVISES TOLEDO MEN.

President Coates Sends Them Service Talks To Impress the Need of Courtesy and Teamwork.

The problem of how to get the most out of your employes has been tackled by Frank R. Coates, president of the Toledo Railways & Light Co., and he is undoubtedly making great strides toward efficient service. For that reason, every property, oil, gas, traction, electric, water power or any of the numerous branches of the service can profit by what the Toledo company has done. He has sent four talks to his men, each of them dealing with problems which present themselves daily. These talks were sent, one at a time, to the Toledo employes, and because they are so effective, it might be well for other companies to work along similar lines. The following extracts will give some idea of the sort of talk Mr. Coates has distributed:

Courtesy.

This from this first one, entitled "Courtesy":

BE COURTEOUS.

"Not some of the time to some of our patrons—not most of the time to most of our patrons—*but all of the time to all of our patrons.* Courtesy consists of those kindly, helpful acts we render others that we like to receive ourselves. A friendly 'good morning,' a cordial 'thanks,' a cheery word, a pleasant smile from the man who comes directly in contact with the public will do more to gain good will and friendship than anything else."

The talk continues to emphasize the need of courtesy and points out that a great deal depends upon it. The following is an extract from the talk on "Common Sense":

Common Sense.

"Rules can be made to cover every possible situation that might arise. In every instance when possible and practicable these rules were made to be obeyed. Situations often arise when a man must exercise his own common sense and let his reason tell him the right thing to do—the safe thing to do. 'The Best Safety Device Is a Careful Person.' Without thought and care on the part of the man behind the device, it will avail little. Remember it is always better to cause delay than an accident."

Kindness.

The third of the series is on "Kindness," and after telling how much kindness is appreciated by all who come in contact with a public service corporation, it goes on to say:

"Kindness is an attribute that all may cultivate—it is a mark that always distinguishes the big man—no matter what his work may be. Kindness is doubly appreciated on days when the weather is disagreeable and passengers are irritable. Then a kind word or a cheery smile will spread the sunshine around. Kindly deeds to others with whom we come in contact, will pay large dividends to ourselves in human happiness, that no amount of money can buy—Be kind."

Team Work.

In the last talk to his employes, Mr. Coates emphasizes the necessity of teamwork:

"Are you pulling together—you boys on the front and back end? Are you both doing your best? We never can get absolute safety in operation, we never can get the good will of all our patrons until there is complete teamwork between both ends of the car. Few get far by pull. Many get there by push. Now let's push with the pull and develop such teamwork that all of us will enjoy our work to the utmost, and achieve the results I believe all of us are after."

Each of the talks are signed by Mr. Coates, thereby giving the idea a personal touch, which is considered so essential in making an impression upon the employe—for his good, as well as for the good of the company.

"Light," the house organ of the Flatbush Gas Co., shows that the men in this organization are keenly responsive to the needs of the country. The roster of the Flatbush company shows that many of the boys have joined the army, that the "Plant That Plot" movement has scores of enthusiastic recruits and that the force took Liberty Bonds to the tune of $8,600.

ABOUT MEN YOU KNOW

Louis J. Campbell, of Youngstown Sheet & Tube Co. Now Major of Infantry.

Louis J. Campbell, vice-president of the Youngstown Sheet & Tube Co., who is now in training at the reserve officers' training camp at Fort Benjamin Harrison, Ind., has been made a major of infantry.

Dan Robertson Resigns as Superintendent at Greenville, O.

Dan Robertson, superintendent of the Jantha Light & Fuel Co., Greenville, O., has tendered his resignation, effective July 1. Mr. Robertson, who has been in Greenville since the Jantha company bought out the rights of the old artificial gas company, will become a broker for gas and oil piping with headquarters in that city. Edward Kagey, who has been employed by the Jantha company in this city for several years, has been appointed successor to Mr. Robertson.

W. P. Guinan, new business manager of the Danbury (Conn.) & Bethel Gas & Electric Light Co., has been appointed to the local committee on food supply, a branch of the state council of defense.

H. R. Rogers, superintendent of the Logan Natural Gas & Fuel Co. at Newark, O., will succeed H. F. Finley as manager of the company's Tiffin (O.) office.

Three Deserved Promotions by the Logan Natural Gas Co.

Effective July 1, James F. Olmstead, who has been local manager for the Logan Natural Gas Co., at Mansfield, O., for over eleven years, was promoted to superintendent of distribution of the system which has seventy plants in as many cities and supplies about thirty-five other cities. Mr. Olmstead succeeds W. J. Broder, who becomes vice-president and general manager of the company. Mr. Olmstead is succeeded at Mansfield by Harry F. Finley, who comes from service with the company at Tiffin and is an experienced gas man.

B. G. Dawes Ambulance Unit in France.

The members of the ambulance unit financed by B. G. Dawes, of Columbus, Ohio., now are in France and engaged in active service. The boys were photographed by the International Film Service after a banquet given in their honor at the Waldorf Astoria. Those in the picture who are known to the gas fields are: B. G. Dawes, Jr., William Dawes, son of R. C. Dawes, of Chicago; D. J. Parr and R. DeArmon, of the Dayton Gas Co. William Dawes volunteered for service in the munitions transport service in France, and now is busy piloting a big motor truck somewhere near Verdun, according to the belief of his parents..

Members of the ambulance unit financed by B. G. Dawes, Sr., of Ohio. Front row, left to right: Paul Westfall, W. Wilder, B. G. Dawes, Jr., C. R. Vigett, H. E. Sibley, B. H. Putnam, D. J. Parr, and B. F. Crawford. Second row: J. W. Wyckoff, K. C. Tabler, J. F. Frazer, L. R. Ikard, B. W. Baer. Third row: Thomas C. Manton, Sol-Lindsley, Dudley Nye, Rutherford De Arman, Malcolm Cook and Norman D. Van' Ausdal. Back row: John Bailey, Charles Dudley, Jr., Francis McIntyre and William Dawes.

Wm. M. Crane Men Enlist for Service

Goodbye, Vulcan Bulletin. May your whole gang take a message to Berlin as effectively as you used to get your stuff across to the gas field in the pages of the welcome little Crane house organ. The Wm. M. Crane Co. is holding open the jobs of its men who have enlisted and as A. W. Humm, editor of the Bulletin is among those signed up for military service, the paper goes out of business until the end of the war. Crane's volunteers are: *Office*—Wm. C. Hammond, aviation corps; R. W. Hart, navy; Wm. Higgins, navy; A. W. Humm, navy. *Factory and Foundry*: E. Eveland, navy; L. Corrello, army; E. Freer, navy; E. Timm, army; R. Menig, army; O. Ruvere, army; S. Cox, navy; J. Morrison, navy; H. Yoss, army; R. Falconer, army; J. White, army; F. Crocker, navy; Theo. See, army.

One of the first of the war brides is Mrs. T. C. Alfred, the daughter of Mr. and Mrs. Chas. Harbison, of Lancaster, O. Young Alfred is a "rookie" at Ft. Benjamin Harrison, Ind. The couple eloped recently and were about to put one over on the old folks. In the nick o' time Harbison and his wife arrived and witnessed the tying of the knot.

Clare N. Stannard, secretary of the Denver Gas & Electric Light Co., and E. R. Kelsey, publicity manager of the Toledo Railways & Light Co., attended the recent national convention of Rotarians held at Atlanta.

Geo. Caine, formerly of the water heater department of the Laclede Gas Light Co., now is an engineer in the United States army. Mr. Caine is one of the livest youngsters in the gas business and under John Burns developed into a star water heater salesman as the records of the Laclede company indicate.

W. J. O'Rourke, until recently at Waukegan, Ill., now is superintendent for the Central Indiana Gas Co., having charge of the National chamber oven plant, which will be operated to supplement the company's natural gas supply.

W. R. Robinson, formerly superintendent of the Staunton (Ill.) Gas Co., has accepted a position as commercial agent of the Elkhart (Ind.) Gas & Fuel Co.

OPINIONS *AND* COMMENTS

GO EASY.

In several states where natural gas has run short the operating companies have threatened to shut off gas unless favored with higher rates. There is justice in a petition for increased rates when expensive improvements are required to continue service and the supply even then seems likely to not last long. However, the situation is one that should be handled tactfully—if not through a reasonable agreement with the local authorities, then through appeal to the state commission. Arbitrary discontinuance of service is sure to provoke a storm, and sentiment thus aroused may lead to unfavorable legislation. In New York state, the legislature recently fixed a rate which was carried into court and decided by no less a person than ex-supreme Justice, Chas. E. Hughes, adversely to the gas interests. As things now stand, the gas companies of that state are at the mercy of a band of Albany highbinders, even the state commission's hands being tied by Justice Hughes' decision. It will take time and hard work to remedy this situation, a new legislature, if not other courts, being required in order to establish justice. In the meanwhile, it would seem good policy for other companies in other states to do all they can to avoid such situations. Arbitration and diplomacy should be tried thoroughly. Every available, tactful means should be exhausted rather than blunt methods which encourage adverse legislation. It is well to always try to please the people for as a rule, the people have "the last say."

LANE'S LETTER.

In another part of this issue will be found an account of the conference between bituminous coal operators and government officers, which resulted in substantial reductions in the prices for coal. Supplementing his remarks on that occasion, Secretary of the Interior, Franklin K. Lane has issued the following letter. Read it and note the broad and appreciative spirit with which at least some members of the administration are endeavoring to meet business interests under very trying conditions. Secretary Lane says:

I have just learned of the action of the coal operators, and I wish to express my appreciation of the generous, prompt and patriotic manner in which they have acted. They have dealt with the situation in the way I had hoped they would, as large men dealing with a large question. They manifestly see that this is no time in which to consider primarily the opportunities which the war gives for personal aggrandizement. We must gain for each by gaining for all. The country is in a mood for sacrifice. It is intent upon the success of the war and is willing to do everything needed to give insurance to the world against a repetition of this awful condition. Will you not be good enough to express to the coal men my appreciation of the spirit they have shown in determining that their prices shall be reduced so that the industries of the country may not feel hampered, and so that the people may not feel broken in spirit by the thought that this is to be a war for individual advantage instead of self-protection.

The GAS RECORD

MONADNOCK BLOCK, CHICAGO, U. S. A.

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H. D. Fargo . . . . . *Vice-President*
H. B. McMeal . . . . . *Secretary*
Herbert Graffis . *Treas. and Adv. Manager*
Milt Saul . . . . *Vice-Pres. and Editor*
Walter V. Turner . . . *Technical Editor*

SUBSCRIPTIONS

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THE NON-POLITICAL ERA.

A new era seems finally to have arrived in Illinois, in respect to dealing with utility problems. The Chicago situation, which was both immense and complicated, has had other factors more annoying than politics to contend with all along and when it finally reached the city council, that body for once forgot politics and hastened to act in the interest of the public.

Commenting on the action of the council the Chicago Herald remarks that, "for the first time in many years the municipality and the corporation have arrived at terms by negotiation instead of by political battling. In spirit and in method at least the new ordinance is right. It is admittedly a compromise. Neither the gas users nor the stockholders obtained all that they desired. But the best was secured from a difficult situation and a plan was evolved which ought to be increasingly satisfactory as time goes on. As immediate concessions both the heating power of gas and prices were reduced. The actual cost to the consumer, according to the experts, will for the present be much the same. But the change in the heating standard enables the corporation to make essential manufacturing readjustments. The production of gas in the future will be more economical. More scientific methods can be utilized. That is a definite advantage to all. Nobody gains when obsolete manufacturing systems are in vogue. Finally the savings which are expected from the new plants will be distributed. A profit-sharing arrangement will automatically reduce the cost to consumers. Thus a long step has been taken toward the permanent elimination of gas from politics, a separation wholly desirable."

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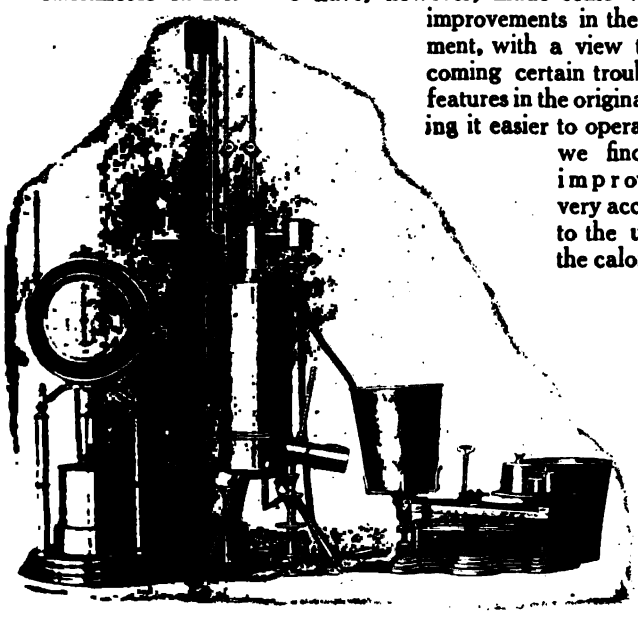
As manufactured exclusively by the American Meter Company

is of the same general design and operates on the same principle as the well known Junkers Calorimeter, which has heretofore been regarded by gas experts as the most satisfactory form of calorimeter in use. We have, however, made some valuable improvements in the instrument, with a view to overcoming certain troublesome features in the original, making it easier to operate, and we find these improvements very acceptable to the users of the calorimeter.



This Calorimeter, with its accessories, is constructed in accordance with the recommendations made by the Committee on Calorimeters of the American Gas Institute. It also has the approval of the Public Service Commission of the Second District, Albany, and has been found by them to give accurate results.

This Calorimeter is now furnished with baffle plates for burner, in accordance with the latest recommendations made by the Committee on Gas Calorimetry of the American Gas Institute and of the Bureau of Standards, Washington.

This Calorimeter is also now made so that it can be taken apart, making all parts accessible. Metal tubing is also used in making the connections.

Complete Details and Prices on Application

The American Meter Company

Established 1834

Western Office: Peoples Gas Bldg. Chicago

New York Philadelphia

FALSE ECONOMY.

"The practice of economy at this time is essential, but economy may be overdone, just the same as anything else," says the Gas Magazine, published by the Ohio Fuel Supply Co., Columbus, "There is a false impression that economy means 'stop spending money,' when as a matter of fact economy only means stop being extravagant, stop wasting money.

"In a great many instances it is economy to spend money, and wasteful not to spend it. For instance, if a gas line is eaten out by sulphur water, as is often the case, it is wasteful not to rebuild and stop the leaks, even with the exorbitant prices for pipe that prevail today. To repair the leaks is not only economical, but gives the customers better service.

"Some industries can curtail expenditures, but not the gas companies—they must continue to spend money or the service will be impaired, and it costs from two to three times as much to build pipe lines as it did two years ago. Therefore the necessity for higher rates is becoming more evident every day.

"Some of the gas companies showed satisfactory returns for last year's business, but it was done on pipe and material purchased a year or more ago—before the abnormal prices prevailed. The last few months the net returns have shown a marked reduction, due to higher costs.

"The Ohio Fuel Supply Co. has expended and is now expending large sums of money on which a return must be made. It is paying extraordinary increases for taxes, materials and supplies, and has made adjustments in employes wages to enable them to meet the higher living costs.

"Gas rates seem to have been fixed at the inception of the business by public opinion, and not by the worth of the service. And public opinion has frowned upon a business-like readjustment of rates from that time down to this.

Give the gas companies a chance to live.

A PLACE TO WATCH.

Chicago will be one of the great gas centers worth watching closely from now on. With new rates that not only are favorable for house-heating and all domestic purposes, but most alluring to large industrial consumers, great developments may be anticipated.

Then, too, an immense new coal gas plant is to be commenced at once, with apparatus for the recovery of all by-products, and many miles of big mains and services are to be installed. Millions are to be spent upon the Chicago undertaking. It is the most inviting situation on the gas map today.

Brockton (Mass.) Gas Men Form Sick and Death Benefit Ass'n.

Employes of the Brockton (Mass.) Gas Light Co. met recently and formed the Brockton Gas Light Employes' Sick and Death Benefit Society. About 200 employes will become members. W. P. Morton was elected president, and the following directors: A. A. Wilbur, J. B. Anderson, E. B. Mooney, W. G. Von Gemmingen, John Sheehan and John Bagge. The directors later elected John Sheehan vice-president, John Bagge, secretary and A. A. Wilbur, treasurer.

Kokomo, Ind., Will Use Natural Gas Exclusively at 55c.

W. R. Higgins, superintendent of the Kokomo (Ind.) Gas Company, writes that by a mutual agreement between the artificial and natural gas companies of Kokomo, that city is to be supplied entirely with natural gas, and the manufacture of artificial gas discontinued. The natural gas comes from local fields, and seems abundant. The present price is 55 cents.

Station B., Detroit, Suffers $8,000 Fire in Purifying Room.

The purifying room of Station B, Detroit City Gas Co., foot of Meldrum Ave., suffered about $8,000 damage by fire at midnight, June 13. This will temporarily suspend operations there and to that extent cripple the output.

New Water Gas Set Installed at Greenfield, Mass.

The Greenfield (Mass.) Gas Light Co. is having a new water gas set installed by the United Gas Improvement Co. of Philadelphia.

Bellefontaine's New Municipal Gas Plant Contract Awarded.

Bellefontaine, O. has awarded the contract for its new municipal gas plant to the Gas Machinery Co. of Cleveland, O.

New Purifying Equipment Being Installed by Baltimore Consolidated.

The Baltimore Consolidated Gas, Electric Light and Power Co. is erecting a new purifying house at Spring Gardens station. It will contain sixteen purifying boxes furnished by Bartlett-Hayward Co. of Baltimore. The engineering work is being done by the gas department of the company through W. R. Puryear, A. Loeser and W. F. Railing.

Fayetteville, N. C. Makes Improvements and Raises Rates.

The Fayetteville (N. C.) Light and Power Co. is putting in a new bench of sixes which are being built by J. H. Gautier & Co.; also, a new station meter, a new Roots exhauster and other improvements. The company has increased rates from $1.50 per 1,000 cu. ft. net to $1.75 per 1,000 cu. ft. net.

Minneapolis Contractors Propose Gas Plant for Thief River Falls, N. D.

The Public Improvement Co. of Minneapolis, Minn., has applied for a gas franchise at Thief River Falls, N. D. The company proposes to lay ten miles of gas mains, and erect a new gas plant this summer, at a cost of $70,000.

J. G. White Corp. To Build Aeronautic Research Laboratory.

The National Advisory Committee for Aeronautics has just closed a contract with the J. G. White Engineering Corporation, for the erection of a research laboratory on Langley Field, near Hampton, Virginia. A wind tunnel of the Eiffel type will be erected for model tests on airplanes, surfaces, and propellers. The laboratory will comprise complete machine, instrument, and pattern shops, as well as a drafting room with the most modern equipment.

Lindsay Light Co. More than Doubles Earnings.

Net earnings of the Lindsay Light Co., Chicago, for the year ended May 31 were more than double those of the previous twelvemonth. Net profits were equal to $6.72 a share for the year, compared to $2.90 a share in 1916. There was carried to surplus $307,003, against $59,411 last year, notwithstanding the fact that $57,000 more was paid in dividends on the common stock than in the preceding year.

Additional Equipment for the North Adams, Mass.

The North Adams (Mass.) Gas Light Co. will install 1,000 horsepower Sterling water tube boilers, mechanical stokers and coal-handling machinery. The contract has been awarded to the J. G. White Engineering Corporation, New York.

The Butterworth-Judson Corp. of New York city, after a severe test in its plant at Brills, N. J., has purchased a McSpirit inhaler and respirator. This device which was recently placed on the market is extremely simple and is said to offer a number of unique advantages. Full particulars can be obtained from F. J. McSpirit, 134 Wayne St., Jersey City, N. J.

J. F. Reynolds is the new manager of the industrial division of the N. Y. Consolidated Gas Co. vice W. K. Eavenson, who recently resigned. Mr. Reynolds has been with the Consolidated company for many years.

R. W. Curran, until recently with the South Shore Natural Gas & Fuel Co. at Buffalo, was tendered a dinner before leaving to begin his duties with the Trumbull Public Service Co. at Warren, O.

COURTS-COMMISSIONS

New Jersey Fight for Lower Heat Standard or Higher Rates.

The fight of the gas companies of New Jersey to reduce the heating units now required or to obtain an increase in rates is under way before the state utility commission. For twelve smaller gas companies in south Jersey, Theodore J. Grayson, of Philadelphia, appeared, and said that his companies, which include the Atlantic City, Wildwood, Tuckerton, Bridgeton and others, do not ask that the rate problem be taken up at the present time, but that they seek a change in the standard or British thermal units from a minimum of 550 to 525. The Public Service Gas Co., principal contender for the reduction in standard and increase in rates, is represented by L. D. H. Gilmore. The first witness was A. E. Forstall, engineer, of New York, who was called as an expert by the Public Service Co.

Pomona Calif., Loses Suit Against Southern Counties Gas Co.

In the case brought by the City of Pomona, Cal., alleging that the present schedule of rates for natural gas to inhabitants of Pomona are excessive and materially higher than rates for similar service in other cities of like size, the commission rules: (1) The fact that a utility may have in effect a lower schedule of rates for the same service in one city than it has in another is not conclusive that the higher schedule is excessive, as the other may have been established for experimental purposes only; (2) Defendant at an expense of $90,000 is now serving Pomona with natural gas of 1,050 B.t.u., as against 580 for artificial gas heretofore delivered. It is not now earning a reasonable return upon its investment nor has it asked for an increase in rates, accordingly reductions in the present schedule are not warranted. Complaint dismissed.

Fair For All—California Utilities Wants Protection.

The Los Angeles Gas & Electric Corp., the Southern California Edison Co. and the Southern California Gas Co. ask the railroad commission for authority to charge an initial deposit of more than $2.50 for domestic or residential service. Under the commission's established rules for metered service of water, gas, electricity or telephone utilities companies may charge not over $2.50 for residences, except where monthly averages are in excess of $2. The southern companies say the present rules do not protect them against bad bills, on account of the shifting and transitory population of southern California.

Mesa, Ariz., Votes To Buy South Side Gas Co's Plant.

The voters of Mesa, Ariz., have decided to purchase the plant of the South Side Gas & Electric Co.

Extra! Women of Seaford, Dela., Ask for Higher Gas Rates.

The city council of Seaford, Dela., is considering a new franchise for the Sussex Gas Co., providing for increase of rates. Women attended a recent meeting and requested the council to grant the new franchise, stating that they would be greatly inconvenienced if gas was cut off during the summer months. The company claims it will have to close if higher rates are not paid, due to increased cost in manufacturing.

Yuma, Ariz., Proposes To Buy the Existing Gas Plant.

F. E. Trask, a consulting engineer of Los Angeles, has submitted his report to the city of Yuma, Ariz., in which he estimates the cost for a complete new water, light and gas system for that city at a cost of $363,987.52. He also made valuations of the existing water, light and gas plants and found the present value of the physical property to be $162,420.25. He has recommended to the city that a bond issue of $300,000 be made, that the existing plants be purchased, and improvements made to the limit of the bond issue. The subject is now under consideration and a bond issue will be submitted to the voters of the city in the early fall.

Hearing of Indiana Gas Assn.'s Petition at Indianapolis.

In addition to requesting a reduction of the B. t. u. standard from 600 to 550, the Indiana Gas Association asks that the period for the regular testing of meters be reduced from five to three years; that the minimum period for testing meters on complaint of individual consumers be increased from six to twelve months, and that gas companies be reimbursed for inspection of meters found to be correct. The commission has set the hearing for July 11 and 12, in room 121, state house, Indianapolis.

Pennsylvania Commission Contemplates Investigation.

It is said the Pennsylvania commission will authorize an engineering inquiry into the natural gas situation in northwestern Pennsylvania. Commissioner Rilling will have a sitting in Oil City in July.

The town of Corte Madera, Marin County, Cal., has filed application with the state commission to compel the Pacific Gas & Electric Co. to supply gas to the town's 600 winter and 1,000 summer residents. The mains now extend from San Rafael to Larkspur, but no gas is served in Corte Madera, about a mile away.

Norman Olson, formerly at Jefferson City, Mo., now is new-business manager for the Wis.-Minn. Light & Power Co., at La Crosse, Wis.

Theo. Slade Succeeds Percy Briggs as Manager at Eldorado, Kan.

Theo. Slade, of the Kansas Gas & Electric Co., Topeka, went to Eldorado the first of July to take the superintendency of the office in that city. The field includes the towns of Whitewater, Potwin, Benton, Towanda and the country around Augusta. Percy Briggs, former manager, will remain with the company, being transferred to some other office. Mr. Slade is a graduate of the University of Kentucky and has been in the employ of the Kansas Gas & Electric Co. for the last six years.

Death of E. W. Ansted, President of Connersville (Ind.) Blower Co.

Edward W. Ansted, president of the Connersville Blower Co., Connersville, Ind., died June 19, at his home in that city. Mr. Ansted was born in Jefferson county, New York, Jan. 24, 1852. At the time of his death he held executive positions in several companies, including the Lexington-Howard Motor Car Co., Ansted Spring & Axle Co., Central Mfg. Co., Indiana Lamp Co., and Hoosier Castings Co.

W. F. Croston, Gas Supt. at Newport News, Va., Is Dead.

It is with deep sympathy and regret that we announce the death of Mr. W. F. Croston, superintendent of the Gas Department of this company.

Gilbert P. Bogart, Chicago sales representative of the Linde Air Products Co., has enlisted in the aviation section of the United States Army Signal Corps. After two months' instruction at the University of Illinois, he will return to Chicago and take up actual flying practice at Ashburn field, to be assigned later to one of the Eastern aviation camps.

Hurray! The first faint gleam of the millenium sparkles in the "New Business" story about Fred. R. Detwiler, U. G. I. representative in the Frankfort district, Philadelphia. He has been occasionally mistaken for a priest and has frequently exercised clerical functions by smoothing family grievances. A great stunt of his is to have a pocket full of pennies for the kids on his beat. Being beloved in his territory is not his only distinction. He is a Shakesperian scholar, a splendid actor and above all a salesman, having led the fast U. G. I. bunch for a number of years.

Art Lawler, of Hamilton, Ont., now is superintendent for the North Shore Gas Co., at Waukegan, Ill.

CONSTRUCTION NEWS

Probability That Kansas City Will Erect a Big Gas Plant.

A rate ranging from 30 cents to $1 a 1,000 cubic feet may be given Kansas City, Mo., if a schedule filed with the public service commission of Missouri by the Kansas City Gas Co. is placed in effect. If the Kansas Natural Gas Co. fails to furnish a sufficient supply to meet demands the Kansas City Gas Co. proposes to keep out with manufactured gas and the rates will automatically advance. If the natural supply continues to fail after the Kansas City Gas Co. has built a gas works, natural gas service will be discontinued altogether and manufactured gas furnished exclusively.

A petition filed with the Missouri commission by the Kansas City Gas Co. asking for an order authorizing the company to acquire various property, construct extensions and issue stock. The company wants authority to issue common stock totaling $5,000,000 and preferred stock totaling $4,612,284.61. The chief extension desired is of the facilities for the manufacture and distribution of artificial gas. This line of extensions the petition states will cost $1,800,000, and will require a year and a half to build.

Chattanooga Gas & Coal Products Co. To Enlarge Its Plant.

The Chattanooga Gas & Coal Products Co., Alton Park, Tenn., is to construct additions to its plant, which will have a daily capacity of 3,200 gallons of tar and 8,000 pounds of ammonia sulphate.

It is understood that the improvements contemplate the rebuilding of the present battery of 12 Robert flueless ovens and 24 additional ovens. The new ovens will cost approximately $500,000, and will have a daily capacity of 400 tons of coal to yield 300 tons of coke, 4,000,000 cubic feet of gas, 8,000 pounds of ammonium sulphate, 900 gallons of light oil and 2,200 gallons of tar.

Central City (Nebr.) Gas Co. Will Make $10,000 Improvements.

A permit has been granted by the Nebraska commission to the Central City Gas Co., whose headquarters are at Hastings, although its plant is at Central City, allowing it to issue $10,000 common stock for improvements. The stock must be sold at par. The company asked for authority to issue $12,500.

Additional Water Gas Equipment Ordered for Waukegan, Ill.

The North Shore Gas Co. has ordered a 9-ft. 6-in. water gas set to supplement its equipment, at Waukegan, Ill. Delivery has been promised by October 1st, and it is expected that operation will be commenced before hard winter sets in.

W. A. Baehr, of Chicago, Improving Western Properties.

The Great Falls (Mont.) Gas Co. will start at once to enlarge its plant. The new machinery which will be installed is the latest word in gas producing and rated at about two and one-half times the present capacity. W. A. Baehr, of Chicago, president of the company, has been inspecting the property and laying out the plans for the work. He was accompanied by William Wallen, of Oshkosh, Wis., who is financially interested in the company and by Thomas J. Lucas, chief engineer in Mr. Baehr's office in Chicago. They left for Butte, going from there to Pocatello, Ida., where Mr. Baehr has other interests, before returning to Chicago.

New Company Organized To Give Miami Beach, Fla., Gas.

The Miami Beach (Fla.) Gas Co. has been incorporated to manufacture, sell and distribute gas or other illuminants and their by-products; capital stock, $500,000. Officers: H. M. Van Court, president and treasurer; J. A. McDonald, vice-president; Frank B. Shutts, secretary; directors, H. M. Van Court, J. A. McDonald and Frank B. Shutts.

Hibbing, Minn. Is Considering a New Municipal Gas Plant.

The question of a municipal gas plant has been taken up by the council of Hibbing, Minn. Minneapolis people are anxious to take a franchise and representatives will appear before the village board.

Gastonia, N. C. Promised Ample Gas by New Incorporation.

The Gastonia (N. C.) Suburban Gas Co. has been incorporated with $100,000 capital. The concern is backed by Philadelphia money and energy. Gas works of ample capacity for Gastonia and suburbs will be established.

I. E. S. Will Hold "Correspondence Convention."

In lieu of the regular Annual Convention of the Illuminating Engineering Society, which has been abandoned, the Society will hold a "correspondence convention" during the course of which the papers prepared for this annual convention will be circulated among the interested members, in advance of publication in the Transactions, and written discussions on these papers may be submitted for publication. It is believed that in this way the value of the papers and discussions will not be lessened due to the cancellation of the annual convention. Titles and authors of papers will be published in advance in the Transactions and other technical publications. Any who are interested in such papers may receive a copy and submit discussions upon application to the general offices of the Society, 29 West 39th Street, New York.

Elkhart, Ind., Forms a Local Section of the N. C. G. A.

On Monday night July 2d, a local section of the National Commercial Gas Assn. was formed by the employees of the Elkhart (Ind.) Gas & Fuel Co. The meeting was presided over by W. R. Robinson who was elected permanent chairman. F. J. Hickling was elected vice-chairman and J. Weaver Smith, secretary. An inspiring talk was made by John A. Patten, general manager of the company, and plans were formulated which insure making this a live organization. The first regular meeting will be held Monday night, July 9, when a paper on "Fitting" will be read by Supt. Frank Box.

Hollingsworth, of Nichols Gas Fixture Mfg. Co., Files Bankruptcy Petition.

Benjamin C. Hollingsworth, vice-president of the Nichols Gas Fixture Manufacturing Co., 1100 Myrtle Avenue, Brooklyn, has filed a petition in bankruptcy. Liabilities, $48,576.24; assets, $20,352.56.

Advantage of Gas in Heat Treatment of Asphalt.

The Winthrop Asphalt Shingle Co. at Clearing in whose factory gas was introduced as fuel within a few months, has in this brief time discovered the advantages gained are so important, that it is about to double the capacity of its plant, says H. H. Clark in the current issue of the Public Service Lumen issued by the Public Service Co. of No. Ill. Coke, coal and oil, all of which were formerly used were each found in practice to carry objectionable elements in the manufacturing process. This demands the melting of the material used in large tanks, and its transit through various stages to what is termed a saturating tank. The heat treatment must necessarily be under control at all times to secure success to the entire operation. Notwithstanding the apparent superiority of gas fuel with respect to its ready obedience to control apparatus, the traditions of the asphalt industry were such that our installation—the first of the kind in the country—was made with some hesitancy by the users, in this instance. Its complete success is as before said, indicated in the enlargement now making in manufacturing capacity.

Another example of gas quickly establishing its case as the best working fuel is supplied in the plant of the Commercial Chemical Co.

This installation was made quite recently to supply the heat treatment of the manufactured product in a 5 ft. by 12 ft. kiln. The results have proved really more favorable than the expectations and these were confident and high. The concern is now adapting gas to other purposes, increasing its equipment and doubling its demand and consumption.

N. C. G. A. Window Trim Service an Aid To Recruiting.

The National Commercial Gas Association is right down to brass tacks in this business of aiding recruiting. "Help Your Country," a four-page folder suggesting recruiting windows to gas companies has been prepared with the co-operation of the U. S. Navy Publicity Bureau. This folder is being mailed to gas companies, together with three display cards and six large photographic reproductions of life in the navy. The use of this material together with that which may be acquired locally will be of considerable benefit to naval recruiting offices. Gas companies planning to institute such windows will be assisted by the recruiting branch nearest them. This cruiting branch nearest them. This idea will prove very acceptable to gas companies, who eagerly welcome every opportunity to "do their bit." Just a little reminder: When you have your recruiting window display in good shape, send a photograph of it to THE GAS RECORD. We will pass your good work along to the rest of the field.

N. C. G. A. Patriotic Window Design.

Kansas Natural Taken from Commission Control—Gets Fair Rate.

A final decree in the federal district court litigation concerning the Kansas Natural Gas Co. has been filed by Judge Wilbur Booth. The decree makes permanent, an injunction restraining the Kansas public utilities commission from enforcing a 28-cent rate in that state. It also takes control of the company from the commission, decreeing that the company is engaged in interstate commerce. The 28-cent rate fixed by the commission was characterized as being "unreasonably low."

NEW RECORD MADE.

Water Heater Week Better this Year Than Even Before, Says Ruud.

Figures recently made public by the Ruud Manufacturing Co. show that the method of introducing automatic water heaters by intensive selling campaigns, usually known as "Water Heater Weeks," has been even more successful this year than before. Gas companies in many parts of the country, under widely varying conditions, have used these merchandising methods with extremely good results. In Rock Island, Ill., for instance, more water heaters were sold during one week of intensive effort of this kind than had been sold in any two years previously. The total for the week in this city was 83 heaters, which is a remarkable record considering the fact that the population of Rock Island, 1910 census, is slightly less than 25,000. Figured roughly on the basis of 25,000 population, the campaign resulted in the sale of an automatic water heater to every 300 persons.

Richmond, Staten Island, New York, is another place where an extremely successful sales week was held. Twenty-five water heaters a year would have been considered a good year's business here, yet 65 were sold during the 1917 week's campaign.

The Brockton (Mass.) Gas Light Co., which last year held a very successful "Water Heater Week," duplicated its performance this year and sold double the number of heaters.

The national advertising which the Ruud Co. is doing has undoubtedly contributed much to the success of these "Water Heater Weeks." People the country over are now becoming acquainted with the automatic method of heating water and, as a result, gas companies are saved much introductory work and are able to concentrate on the selling of the appliance. Following are figures, as given out for publication by the Ruud Manufacturing Co., showing the number of heaters sold in one week of intensive work in some recent water heater campaigns; Portland, Me., 55 heaters; Waterbury, Conn., 31; Lynn, Mass., 108; Springfield, Ill., 35; Peoria, Ill., 102; Rock Island, Ill., 83; Richmond, S. I., 65; Brockton, Mass., 91; Rockford, Ill., 110.

The Laclede Gas Light Co. has placed its splendid demonstration rooms at the disposal of the food conservation organization of St. Louis housewives and each afternoon it's thronged with women who learn how to make their kitchens do their bit. University of Missouri domestic science authorities instruct the classes. The presence of sailors and soldiers supplies a graphic bond between the patriotism of the women and that of the nation's armed forces.

Laclede Co.'s Food Conservation Class.

The GLEASON SAFETY GLOBE

Endorsed by New York Board of Fire Underwriters whose specifications are perhaps the most rigid in the country.

See that this light is installed over the exits of theaters and other auditoriums.

Get the Gleason catalog of gas lighting supplies.

It is full of modern gas lighting devices founded upon **65 years'** successful experience of the Gleason organization.

E. P. GLEASON MFG. CO.
37 & 39 Murray St., New York

Don't Delay Service Installations

Push your services at a saving of 50% to 80% and eliminate destruction of lawns and pavements.

The EASY PIPE PUSHER

will push service pipes from basements to mains with holes dug only at curb for stop and main for the taps.
Now being used profitably by many gas companies.
Will remedy that labor shortage.
Write for a catalog.

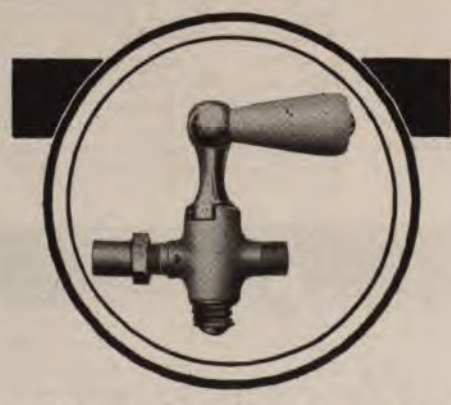
The Easy Mfg. Co.
David City, Neb.

Made to Meet the Gas Man's Need

GOODMAN STOPPER
The Half Minute
GAS MAIN SHUT-OFF

Sold on trial. Guaranteed unconditionally. Information gladly furnished on request.

Safety Gas Main Stopper Company
90 Alexander Ave., New York, N. Y.



Every kind of good brass cocks for gas appliances

Have you our catalog?

DETROIT BRASS WORKS
DETROIT------MICH

LUDLOW VALVES

Extra strong in every detail. Subjected to thorough tests before shipment to natural and manufactured gas companies. *Refer to the Ludlow catalog.*

Ludlow Valve Mfg. Co.
TROY, NEW YORK

Pittsburgh Boston | Kansas City Philadelphia | Chicago New York

PROBLEMS IN THE GAS BUSINESS

Conducted by W. M. Henderson, Assistant Engineer Gas Department, Pacific Gas & Electric Co., San Francisco.

ANSWERS TO QUESTIONS.

212—Economy in Steam Production.

The increase cost of fuel during the past year compels us to economize in our steam plant. What recommendations would you make in order to introduce better efficiency in the boiler room?

The boiler room is the vital point of a steam plant, and it may be possible to produce a considerable increase in economy with little or no initial expenditure, by improving the operating efficiency. Boiler efficiencies of over 80 per cent. have been obtained, and 70 per cent. or above can be maintained in any well designed and operated plant. The average operating efficiency in this country today is about 50 per cent.

The selection of the fuel which will give the greatest value per dollar invested is most important. This depends on the location of the plant, its boiler and furnace equipment and labor conditions. Changes of equipment to suit a more economical fuel may sometimes be advisable, and careful tests may be necessary. Clean boiler heating services are essential to economical operation, and various methods of keeping the boilers free from scale must be considered. Heating surfaces must be kept free from dust, soot and carbon deposit, by blowing with steam jets and mechanical cleaning. Feed water must be heated to the highest practical temperature, preferably by the use of exhaust steam, and the proper type of heater be selected. The temperature of the gases escaping from the stack must be reduced to the minimum possible for the steam pressure carried and the capacity at which a boiler is being operated. To accomplish this, heating surfaces must be clean, the boiler must be properly baffled and the intensity of draught must be properly regulated. The grates or stoker must be selected which will best suit operating conditions and fuels to be used, or these must be changed to suit the grates or stokers. Mechanical stokers will prove more economical than hand-fired grates in many cases, because they reduce the amount of manual labor required in the fire-room and allow the men to give more time to maintaining proper furnace conditions. They usually give more smokeless combustion, some reduction in labor cost and better economy at high ratings, but are expensive to install and high in maintenance cost.

Boiler furnaces should be so designed as to give the maximum possible percentage of CO_2 with little or no CO in the stack gases. To do this they must provide sufficient combustion space to admit of bringing the volatile gases into intimate contact with the air supplied to the furnace before the gases reach the relatively cool heating surfaces of the boiler. The efficiency of a furnace must be determined by systematic flue gas analysis work. Furnaces which are improperly designed must be changed to give the desired conditions. Air for combustion may be supplied in three ways, and the proper system to be chosen must be determined for each special case. Forced draught is to be preferred with small size anthracite coals, but natural draught is usually more economical for bituminous fuels. Forced draught may be preferred when it is desired to increase plant capacity. Boilers may often be operated to advantage at much greater capacities than those for which they are designed, but this usually means some loss of economy, and it is not advisable to operate boilers continuously much above their rating. When considering stack draught problems it must be remembered that intensity of draught is proportional to the stack height, while the gas capacity is dependent on the stack area. Mistakes are sometimes made in design due to a misunderstanding of the relation between area and height of stacks.

The following are the main causes of loss in boiler efficiency and their remedies:

1. Carbonized heating surfaces—cleaning.
2. Scale on heating surfaces—water purification and cleaning.
3. Improper or leaky baffles—change in design or repairs.
4. Poor furnace design—change design or fuel.
5. Improper air distribution to fire—modify draught system or grates.
6. Improper regulation of quantity of air supplied to fire—proper regulation to be determined by flue gas analysis and draught gauges.
7. Leakage of cold air through settings, doors, etc.—test with candle flame, and stop all leaks.
8. Leakage of steam and hot water from boiler and fittings—test for leaks at regular intervals and stop them as soon as found.
9. Loss of steam by blowing of safety valves—proper regulation of pressure.
10. Loss due to irregular supply of feed water—install regulators or force firemen to pay attention to feed regulation.
11. Loss due to radiation—if excessive, cover walls with insulating material.
12. Loss due to sifting of coal through grate—if excessive, decrease size of air openings.
13. Losses due to improper stoking of coal and working of fires—careful training of the firemen as to the best method of handling the coal supplied, and constant supervision of the fire-room force to see that they carry out instructions.

Instrument for Determining Efficiency.

Coal should be accurately weighed if economy of operation is to be maintained. Feed water should also be carefully weighed or measured and daily records should be kept of the boiler efficiency obtained. This is especially important in gas works which operate coal gas plants or auxiliaries, as in such cases boiler fuel per 1,000 may be of little value as an indication of the efficiency of the boiler plant. Care must be taken to see that weighing devices are accurate and losses are accounted for. Steam meters, draught gauges, pressure gauges, moisture determinations, pyrometers and flue gas analysis instruments are all desirable in boiler plants which are to operate with the best efficiency. Feed water regulators are of slight economic value, but will correct trouble due to poor hand feed regulation, and will usually increase safety of operation. Damper regulators are of doubtful economic value, but are an advantage for accurate pressure control with fluctuating loads.

Economy in Steam Consumption.

Most of the steam produced in gas works is used by the gas machines, by the engines driving various kinds of machinery, by pumps, or in the processes auxiliary to the water gas plant. Water gas generators often use steam 150 per cent. in excess of the amount theoretically required. It seems probable that this excess can be reduced by improvement in the method of distribution of steam to the fires. Gas works machinery may be driven by many types or engines, and the type best suited to the

This department will supply information on problems arising in every department of the gas industry. Your co-operation is solicited, both in asking and answering questions. Address: W. M. Henderson, Pacific Gas & Electric Co., 445 Sutter St., San Francisco, Calif.

NEW QUESTIONS.

219—Artificial Gas For Autos.

What conditions would we be confronted with in adapting gas for motor fuel? What are the possibilities of such?

220—By-Products.

In what way can we realize the most from our by-products?

221—Interior Lighting.

In planning a lighting system for interiors, particularly homes, what are the essentials that must be considered, and can you give a salesman a few good tips?

222—Pulleys and Belts.

Do you know of any simple contrivance that can be attached to a pulley that will prevent a belt from running to the side?

work to be done must be carefully selected. Engines must be regularly inspected if they are to be kept in condition to operate with the best economy. Certain simple tests will show their internal condition. Either fan blowers or positive blowers may be chosen for gas works use, but as a rule fans are to be preferred for constant generator conditions and positive blowers for works which are likely to use different generator fuels and require wide variations of air pressure.

Steam pumps are usually uneconomical and must be given constant attention, especially on the water ends. Some new types of valves and valve seats have been put on the market which have helped to increase pump efficiency. Steam supplied to coal gas plants and auxiliaries should be metered and charged to these processes, before wastes can be eliminated. Losses due to steam leakage can be reduced by systematic inspections for steam leaks. Exhaust steam now is being used for heating systems, in exhaust steam turbines, for the production of electric power, and in the process of water gas manufacture, replacing live steam for this purpose. By collecting and utilizing all available exhaust steam in excess of that needed for heating feed water, it may be possible to effect a considerable saving in live steam consumption. The waste heat from water gas machines in blast and illuminating gases is being used for the economical production of steam, effecting a large saving in the cost of operation of gas steam plants.

214—Lighting Stores.

Has there been anything published which covers the class of lighting or type of installation of fixtures for illumination of different class of stores. That is, what must be considered when lighting a barber shop, restaurant, shoe store, cigar store, etc.

A. L. Powell prepared an article on this subject from which the following is extracted. His investigation took him through New York and neighboring towns and covered 800 odd stores. Most of the stores were small and so the report is based on necessity for light and only in a measure is the artistic side considered:

(1). Those demanding equal illumination on the side walls, shelves and counters.

Bakeries—The counters and pie racks require illumination.

Delicatessen—Shelves and show cases occupy both walls, furnishing the principal planes of illumination.

Drug Stores—Walls are lined with shelves holding bottles and packages; the labels must be read easily, tables and counters also must have fair amount of illumination, and a high intensity provided at the prescription counter.

Meat Markets—The meat racks are the surfaces to be lighted, and the local light provided for the ice box. The cashier's desk may also have a small local light.

Glass and China stores are included in this classification.

If the store is a medium width, say 20 feet, two rows of lamps with intensive reflectors or one row with multilight fixtures with wide arms will be satisfactory. There will be a high intensity of direct light on the counters and enough diffused light for the walls. For stores nine and ten feet wide, a single row of lamps will give the desired results.

(2). Stores which demand good illumination on the counters and less light on the side walls.

Cigar Stores—Show cases or shelves occupy at least one wall, and the paper or wall is usually dark, requiring increased light, although discernment of detail is not so necessary.

Dry Goods—Inspection of goods is usually on the counter and this must be brightly lighted for the occasional color matching. The proportion of white goods gives considerable diffuse reflection which adds to the general illumination.

Haberdashery—These stores often have a higher intensity in the front part of the store where the goods are sold; otherwise the general requirements for this group hold.

Jewelry—Direct light of high intensity should illuminate the counter. Clear lamps give a more brilliant light and cause the jewels to sparkle.

Stationery—The conditions are very similar to those of the cigar store.

Fish Markets and Pawnbrokers also belong to this class.

Rows of relatively small lamps with intensive or focusing reflectors hung fairly low and localized with reference to the counters illuminate these to high intensity and diffuse light to the wall show cases.

(3). This group contains stores which demand high intensity on the walls and low general illumination.

Art Stores—Pictures usually cover both walls. These should be preferably specially lighted by angle or trough reflectors with low general illumination for the center of the store. This, however, involves additional expense for installation and maintenance.

Music Stores—The boxes on the shelves lining the walls must be well lighted to permit reading the labels.

Paint and Hardware stores also fall into this group.

For the medium width store two rows of relatively small units giving intensive distribution may be hung fairly high and close to the wall. If the store is narrow, a reflector giving a wide distribution should be used, and all lamps should be frosted to avoid glare.

(4). A number of stores require diffused general illumination, there being no particular plane demanding a greater intensity of light.

Clothing—The walls are usually lined with hanging suits or show cases which must be lighted as must be the center of the store where the goods are shown. A local light should be provided for the mirror. The goods are generally dark and more light is required than in the average small store.

Confectionery — These stores are usually as showy as possible, with mirrors and decorative fixtures. Clear lamps and a blaze of lights seem to be desired. In lighting these places, the ideas of the owners should be given consideration; if a decorative system is demanded, the most efficient one possible that accomplishes this end should be used.

Florists—Only a low value of general illumination is required if the show cases have local lighting. Artistic forms of reflectors are appropriate.

Millinery—The hats are displayed in high glass cases lining the walls, but close inspection is done in the middle of the room.

Restaurants—The tables must be well lighted and with sufficient intensity to permit one to read easily.

Wine and Liquor—The barrels in the rear and bottles on the shelves must be lighted as well as the counter.

Shoe Stores—The plane of illumination is about one foot from the floor, but enough light must be provided for reading the labels on the boxes covering the sidewalls. The customer's bench is usually located in the center of the room between the rows of lamps.

Novelty, Trunk and Leather Stores are in this class.

Single drop units or multiple arm fixtures arranged for even illumination on an assumed working plane at, say, table level, will meet these requirements.

(5). The last group comprises small barber and manicure shops.

Barber Shop—Clear lamps should not be used on account of glare in the patrons' eye. A frosted lamp equipped with an opalescent or frosted prismatic reflector giving an intensive distribution, hung about 7 feet 6 inches from the floor and placed between each two chairs even with the top of the back will give excellent light for hair cutting; and for shaving, the maximum light will be under the customer's chin. There will be enough light for general illumination.

Manicuring—Over each table should be suspended one lamp with a green glass cone shade. General illumination of low intensity should also be supplied.

REPEATED QUESTIONS.

215—Tar From Retorts.

Is there any difference in the yield of tar and such products from vertical retorts compared with the old horizontals?

218—Hard Cements.

Can you suggest a good cement, simple to mix, that will resist acid and withstand some shock?

216—Pitting of Pipes.

After a few years' service it is noticed that steel pipe will show indications of pitting along its surface. What is assumed to be the cause of this?

This subject has been investigated by G. and R. Whipple, who have come to the conclusion that pitting is due to the presence of mill scale. Mill scale is composed largely of iron oxides containing slag, and oxides and hydroxides of iron are capable of acting as elemental electrodes for the corrosion cells; the presence of a small piece of scale would consequently be expected to produce a local corrosion cell of same magnitude and cause the pitting. G. and R. Whipple found that the magnetic oxide of iron was more active in this respect than the red rust Fe_2O_3. Steel work completely covered with scale would not be very liable to attack, since the surface would be fairly uniform. It is only when part of the scale has been removed mechanically, exposing the steel surface underneath, that corrosion proceeds with some speed; the remedy against pitting is clearly to remove all the mill scale before the pipe is stored or put in service.

GAS LITERATURE AT A GLANCE

Conducted by R. S. McBride and C. E. Reinicker, Bureau of Standards, Washington, D. C.

Notes on the Working of a Dust-Fired Boiler.

By C. A. King. "Journal of the Society of Chemical Industry," 36, 114-7; (1917).—via "Chemical Abstracts."—A description with diagram of a boiler setting and furnace for use of pulverized coal. The boiler proper consists of concentric vertical rows of tubes terminating at the lower end in an annular metal chamber and at the upper end in a drum, and a combination chamber of firebricks of semicircular shape lining the innermost ring of tubes. The flame and hot gases travel vertically up the central axis turn near the drum, pass down and under the firebrick wall, and thence circulate among the heating tubes. Full steam pressure of 160 pounds can be raised within 30 minutes of lighting, while manipulation is extremely simple. Tabulated results of tests are included.

Principles of Correct Flame Development and Firing of Furnaces.

By A. Irinyi. "Chemiker Zeitung," 40, 727-9; (1916) via "Chemical Abstracts."—The author recognizes two fundamental principles of firing, parallel current and whirling or eddying current firing. In most of our present methods of firing the parallel current prevails. The ordinary Bunsen burner represents the former type while the so-called flameless combustion is a good example of the second type. Owing to the thorough and rapid mixing of gas and air in the second type of firing, complete combustion takes place rapidly and is confined to a very narrow and well-defined zone of combustion. This cuts down the amount of air necessary to the minimum requirements and results in the attainment of much higher temperatures. The net result of such firing is that the efficiency of heat transmission is greatly increased. It is urged that in all industries such fuel-saving methods of firing be introduced when conditions demand a rigid fuel economy.

Liquid Fuel and Its Combustion.

By J. S. S. Brame. "Chemical Trade Journal" 60, 159-60; (1917); "Engineering" 103, 180-1; (1917); "Colliery Guardian" 93, 433-4.—Petroleum fuel oils are cleaner, more fluid, and have a higher heat value than tar or tar oils. The average calorific value for petroleum fuel oils is 19,400 B. t. u.; for crude tar 15,850 B. t. u. The amount of oxygen in petroleum fuel oil averages 1.5 per cent., while that of crude tar averages 14.6 per cent. The addition of naphthalene reduces the viscosity of the heavy, thick-tar oils. Ample combustion space is necessary in burning oil fuel. The flow of air through the furnace should be retarded. A split fire bridge or a hollow arch, and a hollow brick floor for the furnace allows the introduction of heated air at the proper place in the combustion zone. The design of atomizers is discussed.

Spontaneous Ignition Temperature of Liquid Fuels for Internal-Combustion Engines.

Harold Moore. "Journal of the Society of Chemical Industry" 36, 109-12; (1917); via "Chemical Abstracts."—To secure data for use in his experiments on the Diesel engine, a series of measurements of ignition temperatures of various oils was made. The apparatus consisted of a block of steel 4 inches in diameter and 3.25 inches deep so machined as exactly to receive a platinum crucible with a screw cover which served as the combustion chamber. Temperatures were measured by means of a thermocouple pyrometer fitted into the block as close as possible to the base of the crucible. A current of air or oxygen preheated to the temperature of the experiment was conducted into the crucible and when the temperature was constant a drop of the oil to be tested was introduced. By repeated experiment the minimum temperature at which ignition took place was rapidly determined. Following are results of a few measurements:

Fuel	Temperature of ignition in oxygen	Temperature of ignition in air
Crude petroleum (Texas)	256°	387°
Crude petroleum (Borneo)	269°	380°
Crude petroleum (Mexico)	274°	424°
EtOH	395°	518°
Turpentine	275°	275°
Coke tar (Koppers)	495°	.....
Blast furnace tar	498°	.....
Benzene (100 per cent.)	566°	.....

It is concluded (1) that with increasing molecular complexity the ignition temperature rises; (2) that the ignition temperatures of aromatic compounds are much higher than those of aliphatic, and (3) that unsaturated substances ignite at lower temperatures than the saturated.

Utilization of Waste Heat from Coke Making.

By Henry Peile. "Journal of the Society of Chemical Industry" 36, 112-3; (1917).—Waste heat from coke ovens is being utilized in England for generating electrical energy, for making various alloys such as ferrosilicon, ferromolybdenum, ferrochrome and ferrotungsten. Cuprous oxide is likewise being produced at the rate of 300 and 400 tons per year.

Increasing Economic Importance of the By-products Obtained in the Production of Coke.

By E. Donath. "Montan Rundschau" 8, 185-90, 220-7; (1916); "Chemiker Zentrablatt" (1916), I, 1208-9.—Donath discusses the necessity for a rational utilization of coal in the manufacture of illuminating gas, coke, etc., and outlines recent progress. The production and catalytic oxidation of ammonia, the variety and utilization of the products (fertilizers), the use of benzene and the admixed hydrocarbons (toluene, xylene), tar, and the production of explosives are touched upon.

Coal-Saving Preparations.

By Garelli. "Industria Chimica Mineraria e Metallurgica" (Italian) 4, 103-4; (1917).—The high price of coal in Italy has brought on the market many preparations such as "Carbonite," which are said to increase the heating value of coal as much as 100 per cent. when sprinkled on it in small amounts. Analyses of one of these showed it to contain 75 per cent. NaCl, 11 per cent. Fe_2O_3, 8 per cent. Na_2CO_3, 3 per cent. Na_2SO_4, and 3 per cent. H_2O. "Careful experiments have shown that the addition to coal of small quantities of salts is beneficial, but there is no excuse for the selling of them under false names at prices 50-100 times their real value."

Brown Coal Distillation Industry of Germany.

By D. R. Steuart "Journal of the Society of Chemical Industry" 36, 167-76; (1917).—Steuart describes in detail the methods of lignite distillation and of purification of by-products, as practiced in Germany. A lignite of special quality is required for successful operation—found only in the region of Halle in Saxony and at Messel near Darmstadt—since the ordinary brown coals of the country are too low in bituminous matter. The distillation is carried out in retorts from 5 to 6 feet in diameter and 25 feet high, heated either by coal or gas, at temperatures increasing from the top downwards from 400 to 600°. The high moisture content of the lignite (30 to 60 per cent.), furnishes the steam necessary to protect the oil distillates from decomposition. The coke product, with moisture and ash contents of 20 per cent. and 15-25 per cent. respectively, and a calorific value of 6,000 to 7,000 calories is used for domestic heating and also in metallurgy as a reducing agent for zinc. The crude oil contains various aliphatic and aromatic hydrocarbons with some acid and basic substances. The percentage of combined nitrogen is too small to warrant its recovery. In the Saxon field 12 plants are working up 1,000,000 tons of lignite yearly, producing 60,000 tons of crude oil and 7,000 tons of solid paraffin. Figures for the production in the Messel region are not given.

New Method of Testing Naphthalene Wash Oils.

By J. Wohl. "Zeitschrift der Verein des Gas-Wasserfachmännern" 56, 132-5; (1916); "Journal of the Society of Chemical Industry" 35, 1146.—Progressively increasing quantities of naphthalene are dissolved in the oil, and a current of air is then drawn through the oil at the rate of 10 liters per hour, and after passing through a cooled washing bottle containing glass wool, is led into a solution of picric acid. After the limit of saturation of the oil under the experimental conditions is attained, some naphthalene vapor passes over with the air and is detected by the formation of a precipitate of naphthalene picrate.

Analysis of Toluene and Benzene in Coal-Tar Oils.

By G. Harker. "Journal of the Proceedings of the Royal Society New South Wales" 50, I, 99-105; (1916) via "Chemical Abstracts."—The oil is first distilled up to 170° in an ordinary distillation flask to separate the greater portion of the higher boiling substances while retaining all the benzene and toluene in the distillate. The oil thus obtained is washed with sulphuric acid and sodium hydroxide according to the method of Davis. After standing overnight, the washed oil is distilled with a Young and Thomas still-head in order to assist fractionation. The rate of distillation is regulated to one drop per second and the volume distilled noted at every 5° rise in temperature above 70° up to 140°. The same round-bottom flask and still-head must be used for all determinations. The actual content of benzene and toluene present in the sample is found by carrying out a blank test after each distillation of the oil. In this blank test, quantities of pure benzene, toluene and xylene are added to the residue left in the flask in the proportions they are estimated to be present in the sample of oil. This mixture is then distilled and the volume of distillate of the sample and blank at the same temperature are compared. By this means any error in estimating the proportions of benzene, toluene, and xylene present can be eliminated by adjusting the proportions used for the first blank and redistilling. In distilling the sample oil, the residue is always measured in order to provide a check against possible loss in distillation. It sometimes occurs that the distillation loss exceeds 2-3 cc in which case the distillation must be repeated. The paraffins present in the oil can be estimated either in the benzene or toluene fractions, separately, or in the combined fraction.

Colorado Method Employed in Treating. Tube-Milling Coke.

By G. J. Young. "Colorado School of Mines Quarterly" 2, No. 4, 3-9; (1916); via "Chemical Abstracts."—The coke was passed through a gyratory crusher producing a maximum sized product of one inch diameter, a set of rolls set to ⅛ inch and a four-foot by ten-foot tube-mill lined with silex and using pebbles. About 60 per cent. of the crusher product varied from ¾ to ⅜ inch in size, the remainder being smaller than 3-mesh. About 90 per cent. of the roll product varied from 6 to 65 mesh in size while the best product which could be obtained from the tube-mill approximated 50 per cent. past a 200-mesh screen. By decreasing the fineness of the tube-mill feed and the rate of feed, a much higher yield of minus 200-mesh product was obtained. During grinding the tube-mill product showed a temperature elevation of 16.9° at the discharge from the mill. The dust from the rolls was collected with an exhaust fan and it was found on screening that 75-80 per cent. passed a 200-mesh screen. The densities of the various products were as follows: Coke loaded ready for crusher 23.8 pounds per cubic foot, crusher product 32.5 pounds per cubic foot, roll product 44.5 pounds per cubic foot, tube-mill product 48.75 pounds per cubic foot.

Transport of Hot, Fluid Coal-Tar Pitch in Tank-Wagons for Briquet Manufacture.

Anonymous. "Zeitschrift für angewandte Chemie" 29, 549; (1916); "Journal of the Society of Chemical Industry" 35, 1097-8; via "Chemical Abstracts."—A briquet factory at a Silesian colliery proposes to obtain a supply of pitch direct from a neighboring coal-tar distillery in a fluid form transported in tank-wagons. The system has already been in operation at Bochum, where the wagons holding 15 tons are charged with pitch from the retorts at 250°; in this case the distance on rail in four kilometers and the time between filling and emptying seven hours; the fluid pitch is readily discharged by compressed air. This system is intended to work in conjunction with the Fohr-Kleinschmidt method of briqueting. The pitch is heated to 130-170° to bring it to a mobile condition and then sprayed by a steam-heated atomizer, worked with steam or compressed air, into a mixing drum where the pitch spray solidifies while still in the air to an extremely fine soot like dust. Under the slow rotation of the drum and the action of suitable elevating and transporting arrangements, an intimate mixture of the coal dust and binder is produced, which is then passed to a kneading apparatus with superheated steam and finally pressed into briquets at 50-80°. By this process the proportion of pitch in the briquets is reduced by fully one per cent. (on an average of 7%), and the costs of manufacture are further decreased by the tank-wagon system of transport. The tank-wagons can be emptied in 15 minutes and the necessity of handling, breaking, and melting the pitch is avoided.

A New Method of Extracting the Vaporous Constituents from Coal Gas.

By R. Lessing. "Journal of the Society of Chemical Industry," 36, 103-7; (1917); "Gas World," 66, 178-9; (1917). —The gas is passed through a closed vessel which contains porous material consisting of broken brick or, preferably, molded pieces of standard size and shape soaked in a suitable absorbing substance, that is, green oil or gas oil. The vaporous compounds in the gas which are liquid at ordinary temperatures when isolated and in which the oil is soluble are absorbed. When the saturation point is reached the gas is shut off and steam is blown through the apparatus, which carries away the absorbed substances to a water-cooled condenser whence it goes to a receiver fitted with overflow pipes for water and benzene, respectively. When the distillation is finished the vessel is cooled by means of a water current through its cooling jacket and again into the washing train. For continuous operation a battery of three or more scrubber stills is necessary with a definite schedule of scrubbing, steaming and cooling. Among the advantages of the system are (1) restriction of necessary labor to the manipulation of valves and the collection of distillate; (2) absence of pumps or other moving parts requiring frequent adjustment; (3) rapid cleaning effect of the steaming process, which is applied only once in 24 hours and which requires only a small fraction of the time available for scrubbing, and (4) small loss of oil.

Is Not Gas Power Cheaper Than Water Power?

By H. G. H. Tarr. "Metallurgical and Chemical Engineering," 16, 373-4 (1917).—A 20,000-horsepower water-power plant is contrasted with a 20,000-horsepower steam-power plant using gas as fuel and equipped with Mond by-products recovery system for recovering the nitrogen in the coal used as ammonium sulphate. The conclusion is drawn that the by-products plant is more economical than the water-power plant by about 14.5 per cent. under the same conditions of load, etc.

Hale and Doherty, Multimillionaires Give To Red Cross.

The Cities Service Co. of New York and its subsidiary utility corporations, will contribute $250,000 to the Red Cross, according to a telegram from Henry L. Doherty, founder and president of the parent company.

S. H. Hale, of Kansas City, president of the Hale International Gas Mixer Co., is reported to have given, personally, over $8,000 to the Red Cross recently. Mr. Hale's many friends in the gas industry will be pleased to learn that he has made several million dollars in the Kansas oil fields within the past few years.

Michigan Gas Scholarships Suspended Because of the War.

The two scholarships at the University of Michigan will be discontinued this year as a result of action taken by the executive committee of the Michigan Gas Association. The instructor, Prof. Alfred White, is now in military service. The annual meeting of the association in September also has been canceled, as announced by THE GAS RECORD some weeks ago.

Laclede Gas Light Co.'s Employes Hold Picnic.

The third annual picnic of the Laclede Gas Light Co.'s Employes' Mutual Aid Association was held July 4th, at St. Louis. The gathering was featured by a number of lively contests in which members of the association, their wives and families participated. Two events that revealed promising talent were the pie-eating contest and nail-driving contest for employes' wives.

John Britton Promoted—Gets Job of Umpiring at Baseball.

The fifty-first anniversary of the Oakland (Cal.) Gas Light & Heat Co. was celebrated June 23rd with a picnic by the employes of the Alameda County District of the Pacific Gas & Electric Co. John A. Britton, vice-president and general manager of the company, attended and officiated as umpire at the ball game.

Old Dutch Clock Given Doherty Organization.

A grandfather's clock, made at Amsterdam in 1570, was the gift presented by Cities Service stockholders residing in Holland, to Henry L. Doherty & Co., at a recent dinner in New York. The gift was made by the Hollanders as a token of their esteem for their American associates.

RECENT PATENTS

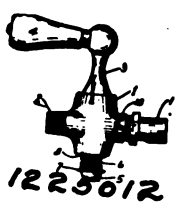
By R. S. McBride, U. S. Bureau of Standards

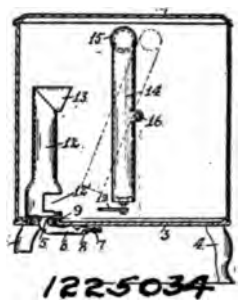
Patents Granted May 8, 1917.

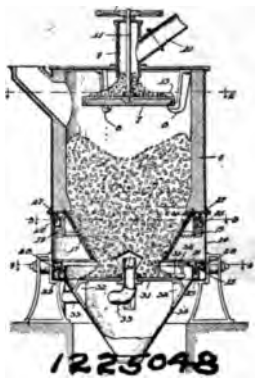
1,224,896* and 1,224,897. OVEN-THERMOMETER. Charles D. Bolin, St. Louis, Mo.

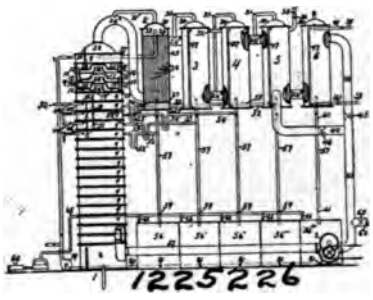
1,225,012.* COCK. Emil L. Claus, Milwaukee. The adjustable cap on the discharge end of the cock has lengthwise angular grooves. The orifice closing member has slidable bearings in these grooves of such shape to fit the discharge openings.

1,225,034.* GAS-RADIATOR. Charles C. Jessen, Oakland, Cal. A flue-pipe within the shell, open at its lower end to the lower portion of the shell interior and at its upper end adapted to register with the shell exit; a pivot connection suspending said flue-pipe within the shell; and means for swinging said flue pipe into and out of registration with the shell exit.



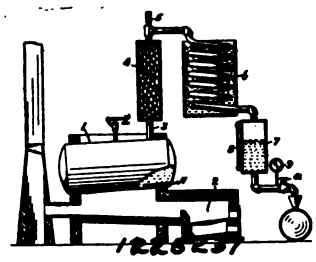


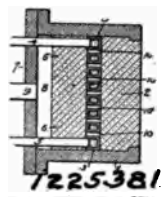


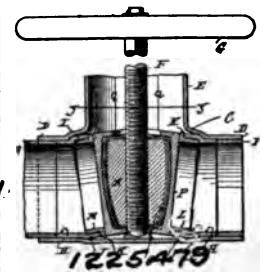


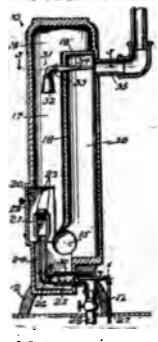
1,225,048.* GAS-PRODUCER. Emil Nimphius, Evanston, Ill., assignor of one-fourth to James H. Whitaker, Chicago. The grate is provided with sides having air passages through it and extending inwardly at an inclination opposite to the direction of rotation.

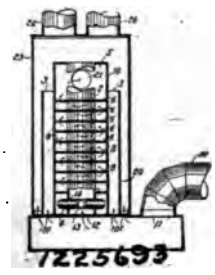
Patents on subjects of interest in the gas industry were granted on the dates indicated. The page in the Official Gazette of the United States Patent Office of these dates is shown in parenthesis for each patent. Numbers marked thus (*) are illustrated. Printed copies of patents are furnished at 5 cents each by Commissioner of Patents, Washington, D. C.











1,225,084. PRESSURE INDICATOR AND REGULATOR. William M. Von Sick, Los Angeles, Cal., assignor of one-half to Daniel M. Critchley.

1,225,226.* DISTILLATION PROCESS. Henry L. Doherty, New York. The method of distilling volatile ingredients from liquid bodies which comprises the counter-current contacting of a liquid carrying volatile ingredients with a gaseous heat-carrying medium and the introducing of heat into said gaseous medium at a locality intermediate between the locality at which the said liquid makes contact with the locality at which the same liquid breaks contact with said heat-carrying medium.

1,225,237.* MANUFACTURE OF TOLUOL. William H. Gartley, Philadelphia, assignor to the United Gas Improvement Co., Philadelphia. In the process of making toluol the method which consists in subjecting the naphtha of gas tar distillation to destructive distillation in a pressure still at a pressure exceeding about thirty-five pounds per square inch, thereby converting some of it into toluol recoverable as a distillate and leaving a residue that boils at a higher temperature than the naphtha, substantially as described.

1,225,248.* COMBINATION RANGE. Roger Hogan, Geneva, N. Y.

1,225,383. ACETYLENE-BURNER. Bernard Wiener, Chicago.

1,225,381.* GAS-BURNER. Utley Wedge, Ardmore, Pa. This is a surface combustion burner built in two parts with a cooling device between.

1,225,479.* VALVE. Thomas E. Murray, New York.

1,225,574. APPARATUS FOR CONDENSING GAS UNDER HIGH PRESSURE. Godfrey L. Cabot and James J. Cabot, Boston.

1,225,575.* GAS-HEATER. William H. Cain, Los Angeles, Cal. This is a ventilated gas radiator built in two parts.

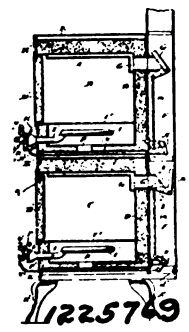
1,225,693.* GAS HEATING APPARATUS. John Wollant, Cleveland, Ohio. This is a multiple shell device arranged as a hot air radiator for use as a furnace.

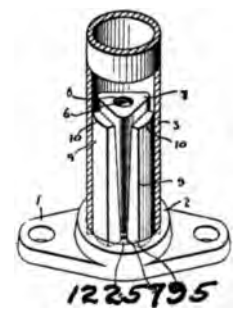
Patents Issued May 15, 1917.

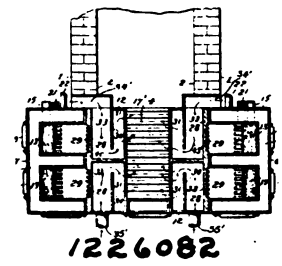
1,225,761. HEAT-CONSERVER FOR GAS-STOVE. Harry Bunce,, East Islip, N. Y. A cover for the range top with lids through which cooking utensils may be introduced.

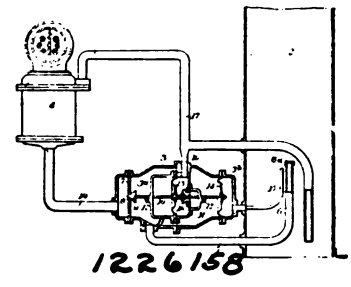
1,225,769.* COMBINED GAS-STOVE AND FIRELESS COOKER. John E. Chambers, Shelbyville, Ind.

1,225,795.* PIPE FITTING. Daniel M. Fraser, Toronto, Ontario, Canada. An anchoring device equivalent to a floor flange.









1,225,802. STOKER. Samuel G. Greenawalt, Shawinigan Falls, Quebec, Canada. A blower and conveyor arrangement for stoking pulverized fuel.

1,225,805. AIR AND GAS COMPRESSOR. Augustus W. H. Griepe, New York, N. Y., assignor to Turbo Co.

1,225,834. WATER HEATER FOR GAS OR GASOLENE. James A. Little, Bismarck, N. D. This device can be swung in place over a burner when it is desired. It heats the water which circulates continuously through the heating space.

1,226,041. TREATMENT OF MINERAL OILS AND RESIDUES FOR THE PRODUCTION OF LOWER-BOILING HYDROCARBONS. Carter White, London, England. Process for the treatment of mineral oils or residues for the production of lower boiling products, comprising bringing the oil or residue in a liquid state on to quicklime heated to a temperature of between about 400° to about 650° C., in the absence of added water vapor, the lime remaining in an unslacked condition during the carrying on of the process.

1,226,043. DEVICE FOR FILLING PIPE-JOINTS. George H. Wilkins, Greenfield, Mass., assignor to George H. Wilkins Co., Chicago. This device is used in connection with cast-metal joints.

1,226,082.* FURNACE OR STOVE CONSTRUCTION. George C. Kidder, Salt Lake City, Utah. A furnace of the character described having a combustion chamber, a retort adjacent thereto adapted to receive a relatively large supply of fuel during the burning thereof and having a communication with the combustion chamber for the passage of the gases generated from the fuel in the retort, an air supplying means conveying air to the combustion chamber to mix with the gases led thereto, said air supplying means consisting of a conduit disposed below the inner wall of the retort and having a plurality of independent air chambers therein, each chamber being provided with spaced discharge openings facing the combustion chamber, one air feeding chamber being disposed above the other, for the purpose described.

1,226,158.* PROPORTIONAL GAS-METER. Thomas B. Wylie, Pittsburgh.

1,226,526. METHOD OF OBTAINING GASOLENE AND OTHER LIGHT OILS FROM HEAVIER HYDROCARBONS. Ulysses S. Jenkins, Chicago, assignor by mesne assignments to Jenkins Petroleum Process Co., Milwaukee.

Steam Stops Fire

Largest Gas Well Fire Extinguished in Louisiana by Unique Method

Extinguishing in 15 minutes' time what is said to be the largest gas well fire in the history of the world reads like modern fiction, yet that is what was accomplished by former Deputy Chief William Guerin in the Louisiana fields recently. The well had been burning for over five days at a rate of 44,000,000 cu. ft. daily and under a head pressure of 1,500 pounds to the square inch, the loss being conservatively estimated at $3,300,000. The well is located seventeen miles west of Monroe, La., and is owned by the Ouchita Natural Gas and Oil Co.

On Saturday, June 16,, a gang of men were working in the well house when there was a terrific crash as the gas pressure blew off the cap from the well and sent it hurtling high in air, with fragments of the 10-in. pipe through which the gas was flowing. Very soon after this there was a tremendous explosion as the gas took fire. Instantly there appeared in the air a huge ball of fire which seemed to hover over the sight. The flames covered an area of several acres and were accompanied by a deafening roar. Owing to the pressure and the speed with which the gas flowed, the flames could not approach the ground nearer than one hundred feet. The employes of the company tried in every way to control the fire, but without effect, and a call was sent for help to the gas companies of Texas, Mississippi and Arkansas. Within twenty-four hours a great number of gas experts were at the scene and many means were sugegsted for controlling the fire. None of them proved available.

Calls Outside Aid.

At this point it was decided to call upon New York for help. A telegram accordingly was rushed to the Pyrene Manufacturing Co., asking them if they could suggest any means by which the fire could be extinguished. Three hours later Chief Guerin, who is head of the company's engineering bureau, started for Monroe on a special train. He arrived on Thursday morning, and after a study of conditions, devised a plan by which the fire was extinguished.

Novel Method Proves Effective.

"After looking over the situation I decided that the problem was exactly the same as one that I had faced while in the New York fire department," Chief Guerin stated. "The only difference was one of degree. Two hose lines working under very high pressure were led up to the well as close as possible and the water turned on. After cooling the ground and what remained of the pipe, the two lines of hose. opposed to each other, were gradually raised. Meeting as they did in the column of gas, as soon as the stream reached the base of the flame, the water was turned into steam, which formed a curtain, shutting off the gas from the blaze above in such a way that the fire was extinguished almost magically."

Representatives of oil and gas interests say that this method of extinguishing a gas well fire is absolutely new and that it provides a weapon which will take much of the terror out of gas well fires in the future. The fire in this case was complicated by the tremendous size of the flow of gas and the terrific heat which was generated. This prevented anyone getting close to the fire to attack it in the usual way, while the pressure of gas made usual methods of procedure absolutely futile.

Producer Gas Plant To Supplement Pittsburgh Supply.

For the purpose of relieving the Pittsburgh district before cold weather sets in, work has been started at top speed upon the construction of an enormous gas-producing plant and pumping station at Downs, W. Va., by the Hope Natural Gas Co. When put into operation this fall the plant will have a capacity of 15,000,000 cubic feet of gas a day. The gas will be made from coal under the Ionizer process and this will be the second plant of its kind in the country, the other being at the Ford factories at Detroit, Mich. The gas produced will be pure, tar, the only by-product, being removed by electricity.

Oklahoma G. & E. Co. Increases Capital 44,900,000.

An increase of capitalization from $5,100,000 to $44,900,000 has been decided upon by the Oklahoma Gas & Electric Co., Oklahoma City, in connection with extensive plans for the future growth of Oklahoma with a special reference to the growing demand for electricity and gas for lighting, power and other industrial purposes. Its engineers and managers are H. M. Byllesby & Co., of Chicago, who state that the additional capitalization will provide for extending operations throughout the state and for future contingencies on an extensive scale, including the construction of additional stations and transmission systems. The Oklahoma Gas & Electric Co., heretofore serving Oklahoma City and El Reno, is acquiring the Enid Electric & Gas Co. and the Muskogee Gas & Electric Co.

John C. Keys Proposes a Gas Plant for Lawton, Okla.

Lawton (Okla.) citizens recently voted to endorse an electric and gas franchise, sought by John C. Keys, manager of the Southwest Electric Co., which is owner of the Comanche Light & Power Co.'s plant there. Mr. Keys is one of the principal owners of a gas well recently brought in southeast of Lawton. Using the gas franchise as an inducement, an attempt is being made to carry the electric right with it. The installation of the gas plant is contingent upon the passage of the electric franchise, and a clause in the electric franchise makes it inoperative unless the gas plant is installed.

Manufacturers Urged To Use Waterways Wherever Possible.

Secretary Redfield has asked the business press to outline to the manufacturers in the different trades and to all others interested in transporting materials, the value of using waterways wherever possible. The bulletin is No. 104,354 and is obtainable directly from the secretary's office. An effort to promote the use of our waterways is a problem of the war department, the commission department and the shipping board.

NATURAL GAS DEVELOPMENTS

May Gasoline Be Extracted Before Natural Gas Is Delivered?

Litigation to determine whether a gas company has the right to extract from natural gas any of its constituents before selling it to a concern with which it has a contract to deliver the gas in its natural state, has been started at Franklin, Pa., by the United Natural Gas Co. against the Alum Rock Gas Co. It is an action in equity, but the plaintiff does not press the court for a preliminary injunction. The defendant accepts service of the bill, and it is apparent that there is an agreement between the companies that the defendant shall not carry out its alleged plans to extract gasoline from the gas, pending the disposition of the matter by the court. The bill recites that the United Natural made a contract with the Alum Rock on July 24, 1909, whereby the latter was to deliver to the former all of its natural gas, except such as was needed to supply Callensburg, and a supplementary agreement was made December 1, 1909. It was the understanding, the plaintiff alleges, that the gas was to be delivered in its natural state, but the defendant is making installations for the removal of "certain natural and constituent parts," the removal of which was not in contemplation when the contract was made.

Dallas (Tex.) Gas Co. Seeks New Franchise.

The Dallas (Tex.) Gas Co. will apply for a new franchise, which the city is said to be inclined to grant, on condition that the company does not raise the rates on natural gas during the seven years of its present franchise or reap a profit above 7 per cent. on the investment, to be based on the valuation being taken of the gas company's property jointly by the company and the city. It is estimated that the street improvements the company will be forced to make during the next five years will be about $1,000,000.

Enid, Okla. Intends To Pipe Gas from Field 14 Miles Away.

Arrangements have been made for piping natural gas to Enid, Okla., from the gas fields fourteen miles east of the city. At present Enid gets its gas supply from Blackwell, 64 miles away, and pays 35 cents, net, a thousand. Under the proposed plans the city expects to get 25-cent gas for residences and cheaper gas for industrial purposes. The local fields are producing in excess of 100,000,000 feet of gas daily.

Louisville Gas Co. Will Extend Mains to Army Cantonment.

The Louisville Gas & Electric Co. intends to extend its gas and electric service to the army cantonment to be established near that city and will make no charge for the work. The rates will be the same as those in the city.

Natural Gas Men Meet at Parkersburg, W. Va., July 11-12.

Natural gas men will gather in Parkersburg, W. Va., July 11 and 12, to discuss gas conservation and the importance of utilizing all heat units in the fuel. Edwin Robinson, of Fairmont, W. Va., is secretary of the West Virginia Natural Gas Association.

Sixty Mile Pipe Line for Southern California Gets Franchise.

The Board of Supervisors, of Santa Rosa, Calif., has sold to the Pacific Service Co., of Los Angeles, a franchise for gas mains in Healdsburg, through to Geyserville and Cloverdale, and on to Ukiah, where the existing gas plant has been bought, making a pipe line of over sixty miles. The concern also has applied for a franchise in Healdsburg and Cloverdale.

Ripley and Sladen Promoted at Wichita.

To relieve the burden of work from L. O. Ripley, vice-president and general manager of the Kansas Gas & Electric Co. at Wichita, the board of directors has elected W. A. Wadsworth, of Cincinnati, Ohio, district manager for Wichita, under Mr. Ripley. Mr. Ripley will remain vice-president of the company. H. S. Sladen, assistant general manager, was chosen general manager, and will be in charge of operations and construction work for the entire district. The advancement of Mr. Sladen and Mr. Ripley is most gratifying to their many friends, who appreciate their faithful work. The board also passed on $1,000,000 worth of expenditures for Kansas, of which amount nearly half will be spent in the Wichita district.

Producer Gas Plant To Supplement.

President M. B. Daly is quoted by the Cleveland papers as saying that the East Ohio Gas Co. thus far has made no plans to install a producer gas plant to use in the event of a shortage of natural gas next winter. The Union Gas & Electric Co. is spending $500,000 for such a plant in Cincinnati, that will have a capacity of 15,000,000 feet of producer gas a day. "Use of producer gas in this way is an experiment," Mr. Daly is reported to have said, "and we prefer to let Cincinnati make the experiment. The cost of such a plant would boost the price of gas. Producer gas is low in heat units."

G. L. McKibben, public utilities gas expert for Ohio, advises Clevelanders to buy coal for next winter.

Diament Oil & Gas Corporation of Buffalo, Takes Out Articles.

Diament Oil & Gas Corp., of Buffalo, N. Y., has been incorporated with a capital of $75,000 to manufacture and deal in natural gas and petroleum products. The incorporators are R. E. Diament, J. H. Clark, M. E. Butler, all of Buffalo.

Quapaw Gas Co. To Build Big New Mains in Oklahoma.

The Quapaw Gas Co., of Bartlesville, Okla., is making surveys to construct 16-inch gas mains through entire Ottawa county mining district. This company now furnishes Miami, Okla., and will extend service to Commerce, Picher, Cardin, Century and other camps.

Pawhuska, Okla. Arranging for New Natural Gas Supply.

Pawhuska, Okla., expects to have its own supply of natural gas soon. Under a proposition submitted to the Osage council by Mayor Weiselogel, the city hopes to secure 20,000 acres of proved gas territory which, with the two wells already owned by the city, will furnish an abundant supply of gas for domestic and manufacturing purposes.

Ordinance Passed for Gas System in Santa Barbara County, Calif.

An ordinance has been adopted by the board of supervisors at Santa Barbara, Cal., granting the Midland County Public Service Corporation a franchise to lay and maintain a system of gas pipes and to distribute gas along certain highways of Santa Barbara County.

Los Angeles G. & E. Co. Proposes To Supply Monterey Park.

The Los Angeles Gas and Electric Corp'n has filed an application to operate under a franchise for a gas system issued by Monterey Park, Los Angeles county. The franchise was issued last December for 40 years.

Schools Hit by Shortage of Natural Gas.

Notified that the gas supply will be shut off October 1, 55 of the 150 public school plants in Pittsburgh, are changing over from gas to coal.

Western States Will Devote $312,417 To Improvements.

The Western States Gas & Electric Co. of Stockton, Cal., has been authorized to use $116,993.14 from the sale of its $1,564,000 of debentures to reimburse for capital expenditures during August to November, 1916, inclusive. It is also authorized to use $312,474 to pay construction expenses during the year ending November 30, 1917.

Huntington Beach, Calif., Will Light Streets with Gas.

The board of trustees of Huntington Beach, Cal., has awarded a contract for the installation of reinforced concrete gas lighting posts, fitted with gas lamps, brackets, etc., together with the installation of iron pipe conduits and all the accessory fixtures on Main street from Summit ave. to Ocean ave., to Leigh G. Garnsey on his bid of $13,497.50.

Natural Gas Fuel

This Product a Great Economic Factor, Declares John W. Lansley

The high prices of coal, coke and oil, and the difficulty of obtaining those commodities, have produced conditions closely approaching industrial and domestic calamity in this section of the country, declared John W. Lansley of Dawes Bros. in a publicity article prepared for the Central Indiana Gas Co. Try to imagine the extent of this calamity if the six hundred millions and more cubic feet of natural gas that are daily being sent from the West Virginia fields into a million or more homes and thousands of factories were non-existent or should cease. Try to calculate what would happen to these homes and factories if they were compelled to depend all through the winter upon such solid fuel as they could get at exorbitant prices, in the face of the existing shortage.

It is not reasonable to assume that in the absence of natural gas service all these people would have provided themselves with coal for the winter before the shortage became apparent. A few would have done so, no doubt, but the great majority would have followed their former custom of waiting till cold weather to lay in their coal and would have been unable to procure it when needed. Even had great numbers been provident enough to place their orders early, the shortage would have come that much sooner and the general result for the season would have been equally disastrous. Factories now running full and extra time would have been forced to close down or greatly curtail production, men would have been idle and without earning power, and discomfort would have existed in thousands of homes all through the cold weather instead of during the very few days of impaired gas service. It is only just to the natural gas business that this view of the subject be brought to public attention.

Efficiency of Indiana System.

The efficiency of the system which makes it possible for Central Indiana to have natural gas service was never greater than at this very minute. Not a single element of this great system has failed in its intended work during the stress of an extraordinary demand that, during brief periods and under certain conditions, is so great as to exhaust its capacity. This is shown by its resumption of perfect service the instant the abnormal strain is relieved.

The economic value of natural gas service in homes and industries was never as great as it is today. Never before has it done such important work as it is now doing and will continue to do while present conditions of fuel supply prevail.

Transportation Difficulties.

The element of transportation is of overshadowing importance in the production and delivery of natural gas. Most of the gas fields in various sections of the country are at considerable distances from the centers of population and industry to be supplied. * * * It is possible to overload a gas transportation system, just as it is possible to overload a railroad, telegraph or telephone system. To build so extensively as to make an overload impossible at any time under any conditions, would be to tax the service, and, therefore, the public, with an investment burden that would in great measure destroy the usefulness and economy of the enterprise.

When there is an occasional "shortage" of gas during the very few coldest days of winter, it is quite natural for the consumer to ask why the company does not lay another pipe line. As a matter of fact, additional pipe lines are generally constructed at once when any inadequacy or lack of balance becomes apparent at any particular point in the system. But for a gas transportation company to greatly enlarge or perhaps double its capacity to meet an abnormal demand on one or a half dozen days in a year or several years, would be as unreasonable as for a railroad company to lay an extra line of main track to be used only for the same brief period. The public would have to bear the unjustified expense in the end, and the service would be unreasonably expensive all the year round. In a sense, the law of supply and demand would be violated by overbuilding and true economy would not be possible to such an undertaking.

NATURAL GAS WRINKLES.

Three More Winners of Prizes Awarded by Natural Gas Association of America.

In the last issue of THE GAS RECORD were published a number of the prize winning wrinkles which were presented at the annual meting of the Natural Gas Association of America. The following three wrinkles were among the ten best selected by the committee on awards.

Notice Card.

O. M. Baldwin, of the East Ohio Gas Co., Kent, Ohio, submitted a card which is handed out at the time application is made for a meter. The applicant is instructed to read the card carefully, so that there will be no delay about setting the meter when the gas man comes to do so. These instructions are printed on a card of suitable size:

BE SURE TO READ THIS.
To Avoid Delay in Having Gas Turned On Kindly Observe the Following Directions.

First—See that all gas appliances have solid connections; that is, use pipe instead of hose for connecting stoves, grates, etc.

Second—Do not connect any gas appliance unless it has a proper flue connection.

Third—Be sure that all openings in gas lines are plugged or capped.

Fourth—Place an independent valve on riser to your gas range or heating stove.

Fifth—Examine each opening where stove pipe connects to chimney to see that it is free of soot and other obstructions.

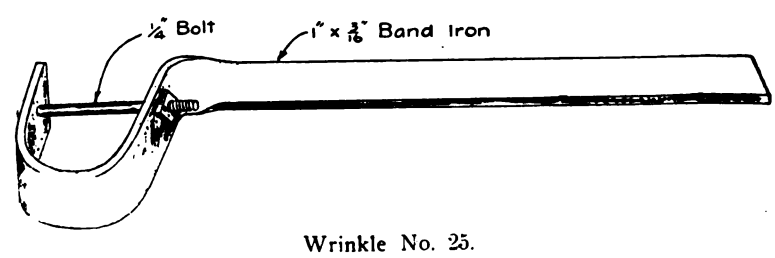
The above directions are to insure safety and our employes are instructed not to set a meter unless these directions are complied with.

Adjustable Meter Support.

O. C. Hartsough, of the East Ohio Gas Co., Canton, Ohio, and P. Kennedy, of the East Ohio Gas Co., Cleveland, were awarded sixth prize for wrinkle 25. This meter support attached to the riser of the service and set at any height desired. It gives more satisfaction than the old style meted spuds, which were always liable to get loose.

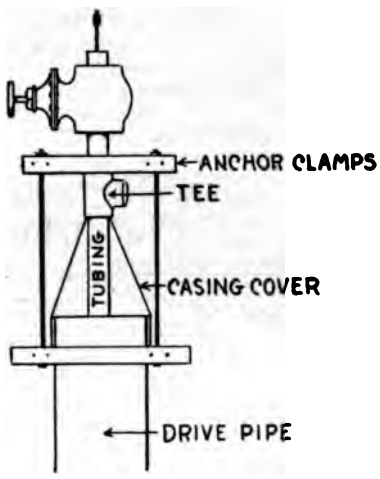
Protecting Casing from Rubbish.

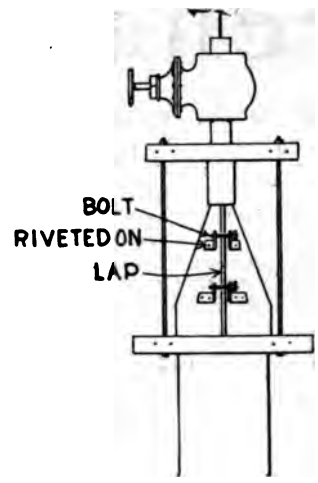
Wrinkle 132, submitted by A. G. Boyd, district superintendent, Ohio Fuel Supply Co., Ashland, Ohio, was



Wrinkle No. 25.

seventh in the list of awards. When a well is left open at the top in the drive pipe and casing around the tubing it leaves a well in such shape that any one can drop rubbish, iron, etc., down inside the casing. This is very expensive to a company when they start to clean a well, on account of causing the tubing and packer to stick and often causing a pipe fishing job. A casing-head would be rather expensive for this purpose, and we have tried packing rope around the tubing in top of casing, but we found this was not a success, on account of it working down, then if there comes a time that we wish to "mud" a packer we are up against it. Now I have a new wrinkle which is cheap and it answers the purpose well. It is a simple, funnel-shape arrangement, made out of galvanized iron, large enough at the bottom to fit down around the drive pipe and reduced to about the size of the tubing to fit around the tubing under the tee. A lap runs up and down with a little lug riveted on each side of the lap. At the top and bottom a bolt runs through these to draw it up tight around the tubing and drive pipe. We find this simple arrangement is very satisfactory. See rough sketch.





Wrinkle No. 132.

FIELD OF FINANCE

Midway Gas Co. Shows Big Financial Improvement.

The Midway Gas Co., of San Francisco, has inaugurated dividends on its preferred stock, with a dividend of $14 per share, payable July 15. The disbursement, amounting to $96,929, represents cumulative dividends on the preferred for two years ended June 30, 1917. The company, which reduced its corporate deficit from $223,854 in 1915 to $75,817 at the end of 1916 was in a position to pay dividends as a result of greatly increased earnings from November, 1915, to the end of April, 1917. The comparative cheapness of gas for industrial fuel since the price of fuel oil commenced to advance has been a strong factor in the improvement of the company's financial position. Officials say they expect to pay regular quarterly dividends on the preferred hereafter and hope to place the common stock on a dividend basis soon.

Gastonia, N. C., Now Well Fixed as Regards Gas Service.

The Gastonia (N. C.) Suburban Gas Co. has been reorganized and reincorporated with $100,000 capital.

Ohio Cities Gas On 20% Annual Basis and Future Stock Dividends.

The Ohio Cities Gas Co. has voted to put the $35,000,000 stock on a 20 per cent. annual basis. The reduction from the current rate of 25 per cent. will occur after the purchase of the Pure Oil Co. is completed. The management intends to continue declaration of stock dividends from time to time, as in the past.

Milwaukee Gas Light Co.'s Assessment Increased $400,000.

An assessment of $2,900,000, an increase of $400,000 over that of last year, has been placed on the property of the Milwaukee Gas Light Co., in Milwaukee county. The assessment on the company's property in the city is $12,617,750, an increase of $384,870 over that of last year. The company's property in towns outside the city is adjudged as follows: Wauwatosa, $89,790; Greenfield, $62,520; East Milwaukee, $54,950; West Milwaukee, $37,790, and Lake, $37,150.

American Gas Co., Philadelphia, Gives Shareholders Surprise.

The American Gas Co., of Philadelphia, quietly sprung a pleasant surprise recently, by declaring a stock allotment of 21 per cent., in addition to the regular cash dividend of 2 per cent. for the quarter. The new stock, amounting to $1,354,400, will be offered shareholders of record June 23 at par, $100 per share, and will be payable in three installments: July 17, $25; a like amount October 1, and the remaining $50 November 30. The company's total authorized capital is $15,000,000. When the new stock is absorbed the outstanding issue will be $7,804,100. In 1915 the company made a stock allotment of 20 per cent., and last year issued $1,000,000 of 6 per cent. debentures to retire a like amount of notes. The proceeds of the new stock will be used for improvements. The shares have sold around $118, the dividend having been increased at the end of 1915, from 6 to 8 per cent.

Ashtabula Gas Co. Appeals Rate Case To Supreme Court.

The Ashtabula Gas Co. has appealed to the supreme court from the order of the state public utilities commission fixing rates to be charged Ashtabula consumers. The company says the proposed rates are not high enough to enable it to properly realize on its investment.

Big Gain Shown by Southern California Gas Co.

The Southern California Gas Co., of Los Angeles, for the twelve months ended May 31 showed net earnings of $403,924, as compared with $287,111.37 the year before.

Enormous Earnings Shown by Empire Gas & Fuel Co.

Earnings of the Empire Gas & Fuel Co., of Bartlesville, Okla., for the twelve months ended April 30, 1917, showed gross earnings of $13,794,000; net profits of $8,749,000, and balance available for dividends of $7,715,000. This company is a subsidiary of the Cities Service Co.

Lancaster (O.) Natural Gas Plant Showed Well Last Six Months.

The Natural Gas Works made a fine gain the first half of 1917. Receipts for the first six months aggregate $128,101.92. Expenditures paid for gas to the Logan Gas Co. were $99,809.28, running expenses $4,517.93. Total $104,327.21. Balance gain, $23,774.71.

Earnings of Ohio Cities Gas Co. Now Run a Million Monthly.

In connection with the taking over of the Pure Oil Co. by the Ohio Cities Gas Co., B. G. Dawes, president of the latter company states that the net earnings of the Ohio Cities Gas Co. for May, 1917, amounted to $1,000,000. This amount is exclusive of other earnings from departmental leases. On the basis of this statement it seems likely that the net earnings of the company for the current year will be in the neighborhood of $10,000,000, the earnings of the Pure Oil Company for the past year having been $4,300,000, a net showing of approximately $15,000,000 should be made by the combined companies.

NEW PRODUCTS

Coal Purchases

Government and Large Industrial Concerns Contract on B. T. U. Basis

Utility operators are face to face with conditions today which are unparalleled in the history of the gas industry. The rising prices as well as the scarcity of raw materials used in the manufacture of gas are taxing the ingenuity of every company to show a balance on the credit side of the ledger. Gas companies unfortunately are unable like most manufacturing concerns to increase their rates to offset the rising costs of materials. As a result every effort is being made by gas company executives to obtain maximum efficiency in their plants and any device which tends toward that end will be gladly welcomed.

Purchase Coal on B.t.u. Basis.

One possible economy measure which bears careful consideration is the intelligent purchase of coal. The United States government now purchases all of its coal on a heat unit basis. The same is true of thousands of industrial concerns throughout the country. The government has effected large savings since this policy was adopted. It is obvious unless coal is tested for its heating content that the purchaser has no means of knowing whether he is getting all that he is paying for.

Many companies have hesitated to adopt this method for their coal purchases on account of the difficulty of obtaining representative samples and the great amount of work required in doing so. Any one who has ever attempted to obtain a laboratory sample of coal from a car knows that it requires considerable skill and time. This difficulty has been entirely overcome by the introduction several years ago of a device which crushes, mixes and samples automatically at one operation, obtaining a truly representative sample. This device is known as the Sturtevant automobile coal crusher and sampler. Thus it is now possible to obtain a sample of coal in a few minutes where formerly it required hours of tedious work.

Method of Operation.

This machine is no experiment, as its manufacturer has been making rotary crushers for years. The coal sampler and crusher is the same type of machine with the sampling attachment added. The machine is extremely simple, well-built and compact. It runs at slow speed and may be adjusted for fine or coarse work while running by simply turning a hand wheel. Coal is fed into the hopper in 3-inch pieces or finer and is subject to gradual reduction until discharged at the periphery below. A sample spout is placed opposite the discharge opening which is arranged to remove a certain percentage of the product. The sample thus obtained is exactly representative of the whole including the correct proportion of coarse and fine, slate, sulphur and other impurities that are fed into the machine.

Hundreds of these machines are in daily operation throughout the country,

Automatic Coal Crusher and Sampler.

including many of the prominent gas companies in the field. Full details will be gladly furnished by the manufacturer, the Sturtevant Mill Co., Harrison Square, Boston.

Venturi Meters for Hot Water Measurement.

The Builders Iron Foundry, Providence, R. I., has issued bulletin 153, which gives a brief description of twenty-six Venturi meters in the Grand Central Terminal heating system which will serve as a reminder that the Venturi meter is especially well adapted to the measurement of hot water and is widely used for that purpose.

Prest-O-Lite Company Has New Catalog Ready.

A new catalog, covering the widest ranges of oxy-acetylene welding and cutting work, has recently been issued by the Prest-O-Lite Co., Inc., of Indianapolis. A copy of this valuable publication will be mailed by that company on request.

Gas Refrigeration for Cold Storage in Small Units.

The food baron is going to have a tough time of it according to present reports. The Common People squealed lustily, but unavailingly, until recently. Not the least of the items to mark the exact spot at which the worm turned, have been contributed by the gas field. The national preserving campaign in which over 140 gas companies are co-operating is one of the big things that is taking the food supply of the country away from the grasping middlemen. Now along comes the Zander automatic gas refrigerator from which great things are expected in the way of providing cold storage in small and economical units. The well known inventor of the appliance and his associates say that they have the device that will enable the grocer, the fruit store man or even the householder, to maintain a cooling room in his basement big enough for a considerable supply of food. In addition to this cold storage place in the basement, the refrigeration may be extended directly to the ice box upstairs without much trouble as there are no pumps required. The new business possibilities that have been opened in the gas field by the Zander refrigeration machine are said to be tremendous by well qualified authorities. The announcement of the machine's entry into the market as made in a recent issue of THE GAS RECORD, drew inquiries from all parts of the country and at the present writing the reports are all in favor of the Zander invention. The machine has been tested exhaustively, by prominent industrial experts and seems to have one of the brightest futures that has greeted a gas appliance for some time.

Operation of National Chamber Ovens Explained.

The latest letter bulletin in the engineering series issued by the Russell Engineering Co., of St. Louis, explains the operation of a National chamber oven plant. The National Chamber Oven Co., the Stacey Brothers Gas Construction Co. and the Russell Engineering Co. are co-operating in the sale and construction of these plants in the United States, Canada and Mexico. If you are not receiving this valuable series of engineering bulletins, a request to the company will bring them in your mail each month.

Aug. C. Kronquest, maker of the Maywood water heater, has moved into a fine new plant at Maywood, Ill., and is now prepared to care for more business. The Maywood water heater is a particular favorite in barber shops and has gained wide distribution in this field.

The Nye Tool & Machine Works have moved into larger quarters in the building in which they have been located for some years, 128 North Jefferson street, Chicago.

Pulls Good Stunt

Liberty Glow has pulled a good stunt in the gas heating business by attaching to each heater a tag that serves several important purposes. This tag is an invitation for the prospective purchaser to sell himself while waiting for a gas company salesman to get to him, it reminds the salesman of the good Liberty Glow points that may be enlarged upon and it tells the purchaser just what to do in order to get the best results with this popular fireplace warmer. The copy on this tag is reproduced in its entirety for it reveals one of the ideas that is helping the appliance sell itself:

This New Liberty Glow Warmer of Yours.

There is a mighty interesting story back of this warmer of yours, that can be only hinted at here. It was sold to the party you bought it from by a selling agency, that had it made along the lines they suggested.

It was made for a quick, efficient and economical warmer, a warmer to produce instantaneous heat, to take the place of the old gas log, the coal grate and other unsatisfactory heaters. It was made in a factory, where they have made gas appliances of different kinds for years. It was made to give you the greatest amount of efficiency, with the least amount of trouble, possible.

All you have to do after the gas is connected, is to strike a match and turn the valve; the heater will do the rest. The amount of heat that you can get will depend upon the amount of gas you burn.

Never turn the gas on so strong that it will roar, or burn a blue flame

Adjust the gas by turning the screw in valve.

The burner, being in front, throws the flame backward into the heater instead of outward, thus assuring perfect safety in lighting the heater, and operating it. No flame comes out of the front of it to endanger clothing, etc.

Always have a white flame, never over four or five inches long.

When the gas is turned low it will consume from three to five feet of gas per hour, the maximum consumption is from thirty to forty feet of gas per hour on the 19 inch warmer, and from fifty to sixty feet of gas per hour on the warmer that measures 27 inches in width. This heater is constructed of genuine Armco iron that you see advertised so extensively, famous for its non-rusting qualities.

The corrugated copper reflector is made of genuine copper that can be polished with any kind of good metal polish. The brighter you keep it, the more efficient the heater; for it is put there to reflect the light which is heat and throw it out into the room. When you first light the heater, there will be a slight odor from the burning off of the newness, but after that no odor, no dust, no smoke, just heat. Now then, this heater is yours to have and to hold. You can keep it spick and span, looking like new, or you can let neglect do its deadly work. There is as much difference in heaters as there is in cigars or automobiles.

Tuck away in some small corner of your brain the name Liberty Glow. It's the name that will guarantee to you the same good points that you will find in this new heater of yours.

LIBERTY GLOW COLUMBUS, O.

Improved Type of Stoker To Insure Complete Combustion.

Combustion Engineering Corporation, New York, has issued Bulletin B-2, describing its underfeed Type E Stoker. The method of feeding coal into the furnace from beneath the fire is designed to effect the distillation of the volatile matter from the coal, bringing about complete combustion of the gases thereby driven off. The mechanical features of this stoker are described, as is also the application of a volute fan to provide air for supporting combustion. Among the illustrations is one which shows Type E stokers under 600-h.p. boilers. Complete elimination of smoke under varying rates of combustion is claimed to be effected by the continuous feed and even distribution of coal made possible by this stoker.

Frank Evans Resigns at La Crosse —Succeeded by Norman Olson.

Frank H. Evans has resigned as New Business Manager of the Wisconsin-Minnesota Light and Power Co., at La Crosse, Wis. Mr. Evans has had eleven years' experience in the light and power business, having spent seven years in the employ of The Public Service Company of New Jersey, at Plainfield, N. J., prior to his going to La Crosse in 1913. Mr. Evans' future plans are not fully developed, but he expects to spend some 60 days in La Crosse, part of which will be devoted to the first vacation he has enjoyed in a number of years. Norman Olson succeeds Mr. Evans in charge of the company's commercial affairs.

American Gas & Incinerator Co. Incorporated at Vancouver.

The American Gas & Incinerator Co., of Vancouver, Wash., has filed amended articles of incorporation, increasing its capital stock from $30,000 to $40,000. C. R. Talbot, vice-president.

Chicago Is Happy

New Standard and Stepped Rates Adopted—Big New Plant to Be Built

By a vote of 46 to 15 the Chicago city council finally has passed a new ordinance, fixing the rates for gas, and the measure became a law last Friday by virtue of the mayor's failure to attach his signature. Although several attempts were made to amend the measure, it passed as drawn and must be considered a victory for the Peoples Gas Light and Coke Co. The feature which is particularly favorable to the company is the change in method of manufacture and, in return for this privilege, a reduction is made in rates from 80 cents to following schedule:

1,000 cubic feet	75 1-2 cents
1,500 cubic feet	73 2-3 cents
2,000 cubic feet	72 3-4 cents
2,500 cubic feet	72 1-5 cents
3,000 cubic feet	71 5-6 cents
4,000 cubic feet	71 3-8 cents
5,000 cubic feet	71 1-10 cents
10,000 cubic feet	70 1-2 cents

The average consumer in Chicago uses 2,500 cubic feet of gas per month. His bill is $2 under the present ordinance. Under the new rate his bill will be $1.80. Thirty cents is charged for the first 350 ft. or less.

The Peoples Gas Light and Coke Co., under the new ordinance will reduce its heat standard from 675 B. T. U. to 565 B. T. U. and will be required to furnish two mantles free to each consumer to take the place of the flat flames now in use and to offer future mantles at cost.

The secondary rate is 65 cents for each one thousand feet in excess of 10,000 cubic feet and the tertiary rate is 40 cents per thousand for consumption in excess of 50,000 cubic feet. The ordinance, which is for a five year period and will become effective when the company accepts it in writing also provides that the company shall divide with its customers all net earnings in excess of $4,000,000 a year. Last year's net was 5.49 per cent on the stock, so a return to a 6 per cent dividend basis and possibly to the full 8 per cent basis seems possible before the profit division becomes operative.

Passage of this ordinance clears the way for the great new plant of the Peoples Gas Light & Coke Co., which has a large tract of land on the north side of the sanitary district's drainage canal. It is intended to expend on the project in the next year from $8,000,000 to $10,000,000 and, later, about $20,000,000 more.

Canadian Gas Convention at Toronto, Aug. 29-30.

Word from Sec.-Treas. Geo. W. Allen, 19 Toronto St., Toronto, just as we go to press, announces that the Canadian Gas convention will meet in that city, August 29-30, during the Canadian National Exhibition. Gas exhibits will be welcome. The fine program which accompanied Mr. Allen's letter must be omitted till next issue for want of space.

SELECTIVE SERVICE.

Operation of the Draft Law as Applied to Gas and Electric Utilities.

We have been furnished by Sec. Geo. G. Ramsdell of the American Gas Institute with an advanced copy of the "Rules and Regulations Prescribed by the President for Local and District Boards Under the Authority Vested in Him by the Terms of the Act of Congress to Authorize the President to Increase Temporarily the Military Establishment of The United States." These rules and regulations cover the boards in the execution of the selective service law and the National Committee on Gas & Electric Service, wishes to have Section 44 published in full as follows: This is for the benefit of the gas fraternity at large.

Sec. 44.—Procedure of district boards in cases where a district board has exclusive original jurisdiction under the terms of said act of Congress.—District boards have exclusive original jurisdiction, in respect of any person whose name has been certified to a district board as called by a local board within its jurisdiction and who has not been exempted or discharged, to hear and determine all questions or claims for including or excluding or discharging any such person arising under the following provision of said act of Congress authorizing the President to exclude or discharge—

persons engaged in industries, including agriculture, found to be necessary to the maintenance of the Military Establishment, or the effective operation of the military forces, or the maintenance of national interest during the emergency.

A claim for discharge under this provision of said act of Congress may be filed with a district board by, or in respect of, any person whose name has been certified to the district board by a local board within the jurisdiction of such district board as one called for service by such local board and not exempted or discharged.

Any such claim for discharge must be filed with the district board on a form provided by the Provost Marshal General and supplied by district boards and local boards for that purpose on or before the fifth day after the mailing by a local board of notice to such person that his name has been certified to such district board as called for service and not exempted or discharged.

The statement on the registration card of any such person that exemption or discharge is claimed shall not be construed or considered as the presentation of a claim for discharge.

Such a claim may be filed by or in respect of any such person on any of the following grounds:

1. That he is actually engaged in a particular, designated, industrial enterprise, or in a particular, designated, agricultural enterprise necessary to the maintenance of the Military Establishment; that his continuance therein is necessary to the maintenance thereof, and that he can not be replaced by another person without direct substantial material loss and detriment to the adequate and effective operation of the enterprise in which he is engaged.

2. That he is actually engaged in a particular, designated, industrial enterprise, or in a particular, designated, agricultural enterprise necessary to the effective operation of the military forces; that his continuance therein is necessary to the maintenance thereof, and that he can not be replaced by another person without direct substantial material loss and detriment to the adequate and effective operation of the enterprise in which he is engaged.

3. That he is actually engaged in a particular, designated industrial enterprise, or in a particular, designated, agricultural enterprise, necessary to the maintenance of national interest during the emergency; that his continuance therein is necessary to the maintenance thereof, and that he can not be replaced by another person without direct substantial material loss and detriment to the adequate and effective operation of the enterprise in which he is engaged.

The word "necessary" as used in said act of Congress shall be construed and held to mean that the discontinuance of, or serious interruption in, the particular, designated, industrial enterprise, or the particular, designated, agricultural enterprise in which the person is engaged would result in substantial material loss and detriment to the adequate and effective maintenance of the Military Establishment, or the adequate and effective operation of the military forces or the maintenance of national interest during the emergency.

The word "necessary" as used in the phrase "the continuance therein is necessary to the maintenance thereof" in these regulations shall be construed and held to mean that the withdrawal of the labor or service of such person would directly result in substantial material loss and detriment to the adequate and effective operation of the particular, designated, industrial enterprise or particular, designated, agricultural enterprise in which such person is engaged.

Affadavits in support of or in opposition to any such claim shall be filed within five days after the filing of a claim for discharge by or in respect of any such person.

The words of the act "person engaged in industries, including agriculture," shall not be construed and held to mean that a person engaged in a particular industrial enterprise or particular agricultural enterprise is entitled to be discharged by reason of the fact that such class of industry, taken as a whole, or agriculture, taken in its entirety, is necessary to the maintenance of the Military Establishment, or the effective operation of the military forces or the maintenance of national interest during the emergency.

In order to substantiate any such claim the evidence submitted must establish that the particular, designated, industrial enterprise or particular, designated, agricultural, enterprise is necessary to the maintenance of the Military Establishment, or the effective operation of the military forces, or the maintenance of national interest during the emergency.

The evidence must also establish, even if the particular industrial enterprise or particular agricultural enterprise is found necessary for one of the above purposes, that the continuance of such person therein is necessary to the maintenance thereof, and that he can not be replaced by another person without direct substantial material loss and detriment to the adequate and effective operation of the particular enterprise or particular agricultural enterprise in which he is engaged.

In order to assist in securing uniformity in decision and practice of district boards and to provide for co-operation and co-ordination between the necessities of the Military Establishment, the military forces and national interest, and industries, including agricultural, found to be necessary to the maintenance of the Military Establishment or the effective operation of the military forces or the maintenance of national interest during the war, the President may, however, in his discretion, from time to time ascertain and determine which industries, including any agricultural industries, or classes of industries, including agricultural industries, are necessary for the purposes specified in said act of Congress, and may certify to the respective district boards, with the force and effect of regulations prescribed by the President in accordance with the terms of said act of Congress, that a designated industry, including any agricultural industry or a designated class of industrial or agricultural enterprises is or are necessary for one of the purposes specified in said act of Congress.

In the event that any industrial enterprise or agricultural enterprise is included among those so certified, the evidence submitted to the district board must nevertheless establish the facts that the continuance therein of the person, by whom or in respect of whom the claim is made, is necessary to the maintenance thereof, and that he can not be replaced by another person without direct substantial material loss and detriment to the adequate and effective operation of the particular industrial enterprise or particular agricultural enterprise in which he is engaged.

It shall be the duty of each district board to ascertain by its own methods the existing conditions in industries that may be claimed to be necessary within the meaning of the act of Congress and those regulations and the agricultural conditions as a whole within its jurisdiction, as they may be affected by the drafting into the military service of the men called by the respective local boards within its jurisdiction.

It shall also be the duty of each district board to ascertain as near as may be the labor supply available for such necessary industries and for agriculture outside of the men called for military service; and to take into consideration all such facts in determining such claims, and the effect of the efforts of governmental agencies to mobolize and to make such labor more efficient.

If, in the opinion of the district board, the direct substantial material loss to any such industrial or agricultural enterprise outweighs the loss that would result from the failure to obtain the military service of any such person, a certificate of discharge may be issued to him subject to the conditions of section 45 hereof.

Within five days after the closing of proofs in any such case, the district board shall decide in favor of or against any such claim.

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Who Stays to Run the Plant?

U. G. I. Method for Determining What Class of Gas Men Must Necessarily Claim Exemption From Draft May Help Solve this Great Problem

What classes of men are necessary, under the selective draft law, to the maintenance of the gas industry in its relation to "the military establishment, or the effective operation of the military forces or the maintenance of national interest during the emergency?"

This is a question of extreme interest today to every gas company management in the United States, for the day is at hand for gas men of conscription age to respond to the call, excepting only those who are to be exempted under the above quoted clause of the draft law.

Who must be exempted in order that the vital work of the company may be carried on without interruption?

THE GAS RECORD, in order to assist company managements to arrive at a proper solution of this problem, has made diligent inquiry of national and military authorities, and also of men in the gas industry who are qualified to make the distinction between those who are necessary to the office and works and those who are not. The results of this inquiry are herewith presented.

The United Gas Improvement Co. of Philadelphia has adopted a plan that may be taken as typical of the proceedure in the larger gas organizations. First, a letter was sent from the office of J. B. Klump to all the superintendents. This letter reads:

Classification of Registered Employes.

"Please prepare as soon as possible a list showing the name, home address and occupation of all those employes of the company who are registered under the Selective Service Law, classified as follows:

"(a) Those individually not necessary to carry out the company's work, and concerning whose conscription you are more or less indifferent.

J. B. Klump.

"(b) Those individually not necessary to carry out the company's work, but who form one of a force of men whom, under the general conditions of labor that are likely to obtain, it will be difficult to replace.

"(c) Those individually necessary to carry out the company's work.

"The number of employes in the three classes should total up to the number of your 'registered' employes.

"In preparing this list, the following considerations should be borne in mind:

"The National Committee on Gas and Electric Service, representing the gas and electric interests of the country in Advisory Commission of the Council of National Defense, has decided that the business of gas companies and electric central stations belongs to a class that is, under any emergency, essential to the communities they serve; and further, that these commodities, being sources of light and power, and serving as fuels in industrial processes, belong to a class the supply of which must be continued under all circumstances. Therefore, you are warranted in asking the exemption from conscription of those employes whom you consider necessary to carry on the business.

"There is every disposition patriotically to aid the government in its efforts to enlist men, but the nature of our business warrants the stand that it *must* be carried on, and that we must retain the men who are needed to carry it on.

"The employes necessary for the conduct of the business should realize that in serving the company, they are performing as patriotic a duty, and helping their country with the war just as much, as if they were serving under the colors.

"You will probably be called on as employer, to appear before an Exemption

Board in behalf of those employes you wish to retain. You should prepare for these examinations. The arguments for exemption of Class (c) men will be simple, but those for Class (b) men will probably involve general explanations, sizes of gangs, descriptions of processes, etc.

"It is suggested that you also prepare the following data:

"(1) The number of men of conscription age who have left the company's service for voluntary enlistment in the different branches of the military or naval service.

"(2) The number of men—if any—who served on the Mexican border, and who are until further notice being paid by the company.

"(3) The total number of your employes who are of conscription age.

"In general, the following processes are absolutely required: This routine of the gas works or electric plant, the maintenance of the distribution system, the maintenance of service to consumers (complaint work), and the transportation, clerical, storeroom and accounting work that is involved in the processes named.

"The following requirements are more elastic, and your attitude must depend on your judgment applied to local conditions, contractual requirements, etc.: Extending mains to supply new houses, or because of paving work undertaken by the municipality; running services and setting meters in new houses; supplying gas, or current, to new industrial plants, and pushing the sale and use of industrial appliances; extending the mains to supply temporary encampments or other plants of the government, etc.

"The following are doubtful requirements: Salesmen engaged in the sale of domestic fuel and lighting appliances or store lighting.

"In general, the framework of the organization of foremen, inspectors, etc., should be retained. The possible substitution of women, or of older men, in place of young men, should be borne in mind as an advisable expedient in some classes of work."

In discussing this method of procedure in correspondence with Henry I. Lea, of Chicago, Mr. Klump says:

"I am enclosing herewith a classification of registered employes of our company that we made up, and sent out to the carious superintendents for them to classify men in the various departments. The result has been that many superintendents classified their men under Class "C."

"It is a question in my mind whether any man should be placed under Class "C" when some other man could be broken in to do his work. If a large percentage of employes of any one company should be taken, that company might be crippled in its operation. A small number of apparently indispensable men might be conscripted and not interfere with the company's operation.

"It seems that after the men chosen have passed their physical examination, that the time then is to make a plea for the exemption of such individuals only as absolutely are necessary for the company to hold. If you will get a copy of the printed instructions issued by the government on this subject, you will see how the exemptions take place, and I think it will assist you in drawing your conclusions as to who should be exempted and who should not be.

"The letter that I am enclosing will show how we attempted to classify the various employes at our several plants, and I think a perusal will give you some light on views on this subject." (Letter printed above.)

From the office of Provost Marshal General E. H. Crowder, of Washington, who has charge of the execution of the draft, the following bulletin was sent in reply to the request for information, with paragraph 5-a marked for emphasis:

Exemptions, Exclusions and Discharges.

1. From the lists of persons registered on June 5th, names will, on a day to be announced later, be drawn by lot by the fairest system that can be devised. Persons whose names are drawn, and *other persons interested,* will be given an opportunity to present claims for exemption, exclusion or discharge from the draft and to support such claims by evidence.

2. The determination of whether a particular claim for exemption, exclusion or discharge shall be granted, will be made by boards to be appointed by the President. These boards will function under the law and under regulations prescribed by the President. Regulations governing the determination of exemptions, exclusions and discharges will, when promulgated, be made available to all concerned at the offices of the local and District Boards. Until such regulations have been promulgated further information cannot be given as it might later prove misleading; and even after the regulations have been made public, decisions concerning exemptions, exclusions or discharges in individual cases cannot be made by this office, since the law provides that all such cases shall be heard and determined by the Boards to be established for that purpose. The President's Regulations, for the execution of the draft, will be given to the public as soon as possible.

3. The law provides for the *exemption* from draft, of persons in the military and naval service of the United States, of *officers* of the legislative, executive, or judicial departments of the United States and of the several States, Territories and District of Columbia; of regular or duly ordained ministers of religion and students who on May 18th were preparing for the ministry in recognized theological or divinity schools, of aliens and of subjects of Germany whether they have or have not taken out their first papers.

4. Persons who are members of well-recognized religious sects or organizations organized and existing on May 18th and whose creed, *at that time,* forbade its members to participate in war in any form and whose religious convictions are against war or participation therein *in accordance with the creed or principles of said religious organizations,* cannot be *compelled* to serve in any of the military forces created by the Selective Service Act of May 18th, but no such person shall be exempted from any service which the President may declare to be non-combatant.

5-a. The President is authorized to exclude or discharge from the selective draft, or to draft for partial military service only, persons of the following classes: County and municipal officials; custom house clerks; persons employed by the United States in the transmission of the mails; artificers and workmen employed in the armories, arsenals, and navy yards of the United States, and such other persons employed in the service of the United States as the President may designate; pilots; mariners actually employed in the sea service of any citizen or merchant within the United States; those in a status with respect to persons dependent upon them for support which renders their exclusion or discharge advisable; and those found to be physically or morally deficient.

(b). Also, persons engaged in industries, including agriculture, found to be necessary to the maintenance of the Military Establishment or the effective operation of the military forces or the maintenance of national interest during the emergency.

6. NO EXEMPTION OR EXCLUSION SHALL CONTINUE WHEN A CAUSE THEREFOR NO LONGER EXISTS.

7. Whether or not any class or any individual, falls within the meaning of any of the above enumerated provisions, is a question of *fact* and must, in order to constitute a proper claim for exemption, be proved and established before the boards to be appointed by the President for the purpose of passing upon all such claims.

8. There will be one board in each county or, in large cities, one for each 30,000 inhabitants. These boards will hear and determine, subject to review by *District Boards,* all questions of exemptions except those coming under Par. 5-b above. Those coming under the provisions of that paragraph must be determined by District Boards, one of which will be appointed by the President for

each Federal District. These District Boards, in addition to having original jurisdiction over the classes falling under Par. 5-b, shall also, *on appeal,* have the power to affirm, modify or reverse any decision of any local board, and the decisions of such District Boards will be final, except that the President may affirm, modify or reverse such decision under such rules and regulations as the President may prescribe.

"E. H. CROWDER,
"Provost Marshal General."

In the issue of THE GAS RECORD dated July 11th will be found the terms of the selective draft law relating to necessary exemptions, as sent out by the American Gas Institute.

CARBONIZING COAL.

Bulletin 140, on Primary Volatile Products, Just Issued.

Technical Paper 140, issued by the Bureau of Mines on "The Primary Volatile Products of the Carbonization of Coal," by Guy B. Taylor and Horace C. Porter, is a sequel to Bulletin 1. The volatile matter of coal is timely in that in the past three years attention has been directed to the volatile products of American coal in a way not heretofore considered attractive in a commercial sense.

The pamphlet consists of forty-four pages of matter descriptive of experiments on Pittsburgh, New River, Illinois and Wyoming coals with results of distillation at low and high temperatures under vacuum and at atmospheric pressure. The effects of slow and rapid heating of coals and the secondary reactions as a result of heating gas and residue from slow, low temperature carbonization are cited.

The recent work of other experimentors is reviewed and the following general conclusions are drawn:

The Primary Decomposition Processes.

"A high-grade bituminous coal of the gas-making type decomposes by heat primarily into paraffin hydrocarbons and a completely altered nonvolatile residue, with small quantities of water, CO_2, and CO. The three latter products are the first produced, although in small quantity; from some other types of bituminous coal they are produced in greater relative quantities than from the gas coal type. Complex and varied secondary reactions induced by superheating the hydrocarbons, water vapor, and CO_2 are of great importance in industrial high-temperature carbonization.

"The products of low-temperature carbonization from coal of the Pittsburgh type on an industrial scale at about 800° to 900° F. (427° to 482° C.) will consist of a rich gas amounting to 0.6 to 0.7 cubic foot per pound of coal, and a large yield of oil, or tar, comprising 10 to 12 per cent. of the coal. This tar consists chiefly of paraffin hydrocarbons, is very low or possibly entirely devoid of benzene and naphthalene derivatives and practically devoid of free carbon. The gas will contain 6 to 7 per cent. of unsaturated hydrocarbons and 20 to 25 per cent. of ethane and its higher homologues, and consequently will have a high calorific and illuminating value. The tar may be either redistilled or subjected to cracking processes so as to produce light oils—gasoline substitutes—whose yield will be greater than, and probably at least double, that obtained by high-temperature carbonization.

"The results suggest the possibility that low-temperature carbonization might be utilized in gas manufacture as an enriching process by passing through the low-temperature retorts a relatively large quantity of a thin gas such as "blue-water gas," sweeping out the light oil vapors that are primarily liberated at these low temperatures. The utilization of inferior coals for making gas by such a process may be found practicable.

The Constitution of Coal.

"Based on the experimental results of low-temperature decomposition in a vacuum, the following hypothesis is proposed for the constitution of coal:

"All kinds of coal consist of cellulosic degradation products more or less altered by the processes of aging, together with derivatives of resinous substances in different proportions, also more or less altered. These substances are many in number and closely graded into one another in their nature and composition. They all undergo decomposition on moderate heating; some, however, decompose more rapidly than others at the lower temperatures. The less altered cellulosic derivatives decompose more easily than the more altered derivatives and also more easily than the resinous derivatives. The cellulosic derivatives on moderate heating decompose so as to yield water, carbon dioxide, carbon monoxide, and hydrocarbons, giving less of the first three products the more mature and altered they are. The resinous derivatives, on the other hand, decompose on moderate heating so as to yield principally the paraffin hydrocarbons, with probably hydrogen also as a direct decomposition product.

"The more mature bituminous coals with good coking properties contain a large percentage of resinous derivatives, and their cellulosic constituents have been highly altered. The younger bituminous and subbituminous coals consist chiefly of cellulosic derivatives much less altered than those in the older coals. They undergo a large amount of decomposition below their fusion point and, partly for that reason, many of them do not coke."

COAL PRODUCTION.

Large Increase Shown by 85 Roads in June, 1917, Over 1916.

The statement of carloads of bituminous coal that originated on 85 railroads and of beehive coke on 16 roads in June, 1917, compiled from reports received by the Geological Survey, Department of the Interior, by noon, July 16, 1917, show large increases over those of the same period in 1916.

The carloads of bituminous coal originated mainly in the following districts: Central Pennsylvania, Maryland, and New River and Pocahontas fields of West Virginia and Virginia (11 roads); western Pennsylvania, Ohio, and Michigan (14 roads); eastern Kentucky and West Virginia (except New River and Pocahontas fields) (11 roads); Alabama, Tennessee, and Georgia (5 roads); Illinois, Indiana, and western Kentucky (22 roads); Arkansas, Iowa, Kansas, Missouri, Oklahoma, and Texas (10 roads); Rocky Mountain States, North Dakota, and Washington (12 roads).

Total carloads, 85 roads, June, 1917, 750,322; May, 1917, 749,166; June, 1916, 594,531.

Carloads of beehive coke (16 roads), June, 1917, 76,079; May, 1917, 75,905; June, 1916, 72,731.

The increase in these shipments of bituminous coal in June, 1917, was 1,156 cars, or but 0.15 per cent., compared with May, 1917, but was 155,791 cars, or 26.2 per cent., compared with June, 1916. As the three months compared in this statement have the same number of working days, the totals represent the relative changes in rates of production. There were slight increases in June, compared with May, 1917, in the shipments from the eastern and southern fields and from the Rocky Mountain states and Washington. Illinois, Indiana, western Kentucky, and the southwestern states recorded decreases. Every district shown had a large increase in June, 1917, over June, 1916, the most notable increase having been in western Pennsylvania where in June, 1916, the production was curtailed by labor trouble. In the early part of June production was at the highest rate of which there is record, but a falling off in the third week in several states and in the fourth week in others served to lower the average to about equal that of May.

Gas the National Economizer

Invaluable to the Metal Industries, Helps in the Housework and Conserves the Supply of Coal—England Has Learned All These Great Lessons

In all the changes that have taken place, according to an expert in the London Gas Journal, it is satisfactory to know that gas has played an important part; and the fact that gas is an admitted factor in national economy implies that it is also a factor in national efficiency. True economy and efficiency are inseparable.

The whole story of what gas has done for the metal trades will probably not be revealed until after the war; but one may rest assured that it has gained for itself a conspicuous position in the metal industries throughout the country. Almost all our industries have been laid under tribute to gas, either directly or indirectly—more particularly directly in the various spheres of industrial activity, though its indirect use is none the less beneficial. Indeed, the influence which the indirect use of gas exerts on industrial efficiency cannot very well be exaggerated. The excellent types of gas apparatus which have been provided for the welfare of factory workers have contributed in no small measure to the accelerated output of production; but a saving of labor has also been effected in the homes of the workers by the use of gas for various purposes, which has rendered possible the co-operation of women to an unprecedented extent in the industrial sphere. It is a fact that the domestic use of gas in the homes of the workers and elsewhere has indirectly been responsible for much of the increased national industrial output, simply through the saving of domestic labor which is rendered possible. Gas-cookers and gas-fires are nowadays reckoned to be in the very forefront of labor-saving inventions; and certainly they are proving "very present helps in time of trouble." Housewives are daily becoming convinced that the great objection to the use of crude solid fuel is the intensified struggle against dust and dirt engendered by it, which is entirely obviated by the use of gas for cooking and heating. A little consideration will reveal the fact that the national effort is in danger of being somewhat dissipated by the use of crude coal; and this should not be lost sight of when dealing with the questions of national economy. In other words, the distribution of gas simply means the scientific distribution of light, heat and power; and any unscientific distribution of these forms of energy cannot, in the nature of things, conduce to the conservation of the national effort. The waste of effort involved in the distribution of individual supplies of coal is appalling—especially when it is remembered that the organization is already at hand to deal with such supplies in a scientific manner. By using gas for more industrial processes than was formerly the case, a direct saving of labor, inseparable from the cartage and use of coal, has been already effected; and to this extent the national effort has been conserved. It will readily be understood that an essential industry like the gas industry must have adequate supplies of its raw material, coal, in order to maintain, and if possible, extend, its sphere of usefulness.

Gas Co. Employes Hold a Flag Raising.

About 75 of the employes of the Pittsfield Coal Gas Co. participated in the flag raising exercises at the gas works recently. Tap Sergeant Treat of Co. F, was on hand and added to the impressiveness of the exercises. Mayor William C. Moulton added one more to his speaking dates by delivering some very fitting remarks. The men assembled sang the national anthem and "America." To complete the meeting the regular monthly business session was called by President Gleiner. A report was made by the annual outing committee. Following a rather spirited discussion the members of the association voted by a large majority to hold the outing at Riverside Park in Springfield. The date has not as yet been decided upon, though it is the custom to hold the affair in the early part of August.

Hammond, Ind., Has Big Humphrey Heater Sale.

A Humphrey water heater sale was pulled off early in July by H. H. Crawford, commercial manager of the Northern Indiana Gas & Electric Co., at Hammond, Ind., that was a beauty. Sixty-five Humphrey automatic water heaters were sold. There were some tank water heaters sold, too. This sale was unusual in that they were practically all large size heaters. The co-operation that exists between the Hammond boys and the Humphrey specialists accounts for the large sales.

Coatesville, Pa., Co. in New Offices.

The Coatesville division of the Philadelphia Sub. Gas & Electric Co., has moved to new offices at Third Ave. and Main Street, which were recently completed. The opening was featured with a gas range demonstration and also extensive advertising of the preserving and canning movement. The residents of Coatesville are greatly impressed with the gas company's new office and also with the fact that a prominent corner of the city that was heretofore dark and gloomy, is now brilliantly illuminated.

Using 40 Per Cent of Illinois Coal With Good Results.

The "Iron Age" reports that the By-Product Coke Corp'n of Chicago is now making by-product coke which approximates the Connellsville standard from a mixture of 40 per cent. Illinois coal and 60 per cent. eastern coal, and that the success of the experiment has already led other coke makers to follow suit. Formerly it was held that Illinois coal would not coke economically, or that it gave too high ash and too much sulphur. The main significance of the announcement is that the change makes western coke producers less dependent on the East for their raw material, and the hope is expressed that it may yet be found practicable to use higher proportions of Illinois fuel in the mixture.

Nichols Buys Control of Minnesota Company.

At a meeting of the board of directors of the Minnesota Gas & Electric Co. held June 29th, F. A. Otto resigned as manager and H. L. Nichols was elected secretary, treasurer and manager of the company. Mr. Nichols has taken over the controlling stock of the property and has gone to Albert Lea to assume active management.

Radiantfire, the introduction of which wrought a period of intense interest in fireplace gas heating, has several new members in its family. These new Radiantfires are moderate in price and already are in big demand.

The Hugo Mfg. Co. has a new Hawkes ventilating radiator in its line. It is said to have all kinds of new business possibilities and has been especially designed for the purse and needs of Mr. Common People.

SELLING GAS

Everyone Canning

Two hundred and twenty-five cities in forty-three states of the union are pushing the National Commercial Gas Association's canning and preserving campaign. These 225 cities represent 256 gas offices. They accounted for the display of 6,000 July posters in the windows and on the wagons of grocers, department stores, produce dealers, and gas companies; they distributed 400,000 copies of the July folder of recipes prepared by Mrs. Ida C. Bailey Allen, and they gave to women who visited the gas offices and attended lectures, 90,000 gummed label booklets.

August Folder Cover.

The campaign is gathering momentum every day. Its advantages to both public and gas companies are too important to be overlooked. The supply of June material prepared by the association was exhausted long before the total orders and re-orders had been filled, and then even the large extra allowance made in printing the July folders and posters did not suffice to satisfy the increasing demand. Safety and assurance lie in ordering now a liberal supply for each of the remaining months of the campaign—August, September, October and November.

August Poster.

September Poster.

The August and September posters by Carter Housh are even more attractive than the first two of this attractive series; the colored covers of the August and September folders are interesting additions to the types of women who are joining President Wilson's "army of those who serve the nation."

September Folder Cover.

Orders for this campaign material should be sent direct to the headquarters of the National Commercial Gas Association, 61 Broadway, New York, who are prepared to furnish the window posters at 12 cents each, the monthly canning folders at $5 per thousand, and the gummed label booklets at $3 per hundred.

Hot Water for Soldier Boys

How a Philadelphia Regiment of Young Engineers Was Quickly Supplied With Thirty-three Automatic Water Heaters by Gas Company

When the Commercial Museum, Philadelphia, was made the headquarters of the 9th Regiment, Reserve Engineers, there were no facilities for hot baths for such a large number. The U. G. I. commercial department received an emergency call to relieve the situation. In a short time they had installed 30 No. 4 and three No. 2½ Ruud automatic instantaneous water heaters, connecting them with 63 shower baths. The installation of the heaters and all gas connections were made *without charge to the Government.*

From the time the heaters were installed the service has been perfect. One heater supplies two showers and though they run sometimes for an hour without a stop, the water is just as hot as it is when the faucet is first turned. Naturally the men are delighted, and they count it as one of the pleasures of the day to come in after a hard drill and spend a few minutes under the showers.

This regiment is one of the finest bodies of men in the country says "New Business," of the U. G. I. Nearly 300 are college men and the rest of them are surveyors, mechanics, engineers or men similarly trained. Many of them have specialized in railroad work and when they get to France —and that may be soon—their knowledge will be invaluable in rebuilding and repairing the damaged rolling stock. The food they get is well cooked, clean and wholesome, and one hour's drill in the open air every morning and two hours in the afternoon prove such good appetizers that there is no need of relish and sauce. Incidentally the food is cooked on modern, hotel gas ranges. Though the men have been in training less than a month, the hard work of the officers has brought them to a remarkable degree of efficiency, and before they reach "the other side" they will be ready to do anything and go anywhere. Great care is being taken to safeguard their health. Evidence of this could be gathered from the number who are seen walking around with bandages on their limbs, signifying that they had been inoculated against typhoid. The canteen would delight the eye of even the most extreme member of the W. C. T. U., for the strongest drink obtainable is buttermilk.

One corner of the hall is devoted to the Y. M. C. A. Here are tables and chairs for writing, books, magazines, and a piano. There is no scarcity of musicians and to hear one of them play, a group of twenty or more sing while an accompaniment is being whistled by several hundred, is to catch a glimpse of the spirit in which these men, or boys (the average age is twenty-four), will go to the Front.

The regiment will be fully equipped with all kinds of material to make it self-supporting. There are motor trucks—those massive mechanical beasts of burden, and one smiles a little and wonders how much notice will be taken of the plate affixed to them which reads "Overspeeding or overloading will void this warranty." They have motorcycles, too—cavalry of modern warfare—which in this case, however, will be used for messenger service. Krag rifles have been given to the men, and though the regiment is not classed as a fighting unit, they must be made proficient in the handling of the rifle. Nothing is being spared to make this regiment one of which Philadelphia can be particularly proud, and only to look at the determined bronzed faces is enough to convince one that they will make an enviable record in whatever they attempt.

Their appreciation of the Company's service has amply repaid the "U. G. I." for whatever was done.

"We can only hope that they will find living conditions in France as good as those at the Commercial Museum, that they will still get white, wheat bread and good meat and that when they have finished their day's work, they will be able to step under a hot shower and enjoy it as much as they do now," concludes the article in "New Business."

What the Gas Companies Are Doing to Serve Sammy.

The New York Consolidated Gas Co. has a class of 200 students in khaki at its gas equipped kitchen on East Fifteenth St. Most of the men had experience on the border and appreciate the value of well cooked food. A graduate of Pratt Institute conducts the classes, teaching the men how to handle gas ranges, how to cook simple foods and how to clean up after the work. At the 71st Regiment Armory on 34th street, classes also are held five nights a week. The Wilkes-Barre (Pa.) Co. has loaned the Third Regiment of Artillery, three low oven ranges to prepare food for 150 men at the barracks, the company thus obtaining revenue from 100,000 to 125,000 cu. ft. of gas per month.

The Laclede Gas Co. at St. Louis has loaned fifteen all-gas-kitchens to the Armory, one for each company in the First Regiment. These are pleasing the army, its cooks, and the gas company.

At the Plattsburg (N. Y.) barracks twenty-three No. 8 instantaneous water heaters are being used.

Business is Booming with the New Bern (N. C.) Suburban Gas Co.

The New Bern (N. C.) Gas Co. has made quite a hit with its local public through popular and aggressive management. The appliance end of the business is being successfully pushed this season.

Terre Haute Car Works To Use 1,000,000 Cu. Ft. Monthly.

The Citizens Gas and Fuel Co., Terre Haute, Ind., has contracted with the American Car and Foundry Co., to supply gas for 17 rivet heating furnaces, each consuming 300 cu. ft. per hour. The monthly consumption will be approximately 1,000,000 cu. ft.

SLAP THEIR FEET.

Method of Reviving One Who Has Suffered Electric Shock.

A remarkable instance of the recovery of an apparently dead man who had had an electric shock is given by W. P. Strickland, of the New York and Queen's Electric Light and Power Co. The man, when about to erect primary wires, apparently was killed by accidentally touching a wire carrying current at 2,300 volts A lineman immediately took hold of the ankles of the limp body, lifted it until the whole weight rested on the neck, and let it fall He then took a pair of connectors and hammered the soles of the injured man's feet without removing his shoes. Another lineman opened the man's mouth, pulled forward the swallowed tongue (which occurs in electric shock), and was about to begin the Schaefer prone method of resuscitation, when the man returned to life. He was removed to the hospital, and is now well, though suffering severely from his burns. Similar cases of recovery are mentioned in connection with the plan of striking the feet without removing the boots in case of electric shock.

Bankruptcy Proceedings Against Gas & Electric Appliance Co.

Creditors of the Gas & Electric Appliance Co., San Francisco, have filed an involuntary petition in bankruptcy against the concern. It is charged that the company owes debts in excess of $10,000.

The proceedings of the Twelfth Annual Convention of the National Commercial Gas Assn. were distributed the second week of June. The volume contains 677 pages embracing reports, papers and discussions, list of exhibitors and roster of members, both company and individual. The association's individual membership is now near 3,000.

St. Joseph (Mo.) Has To Fall Back on Artificial Gas.

St. Joseph (Mo.) will have no natural gas for some time, according to V. L. Eibert, manager of the St. Joseph Gas Co. While he was at Kansas City last week with J. M. Landon, receiver for the Kansas Natural Gas Co., the latter received word that the remaining gas line which carried the gas from Kansas to Missouri has been carried away by high water. Two gas lines which crossed the Missouri river near Weston, Mo., carried all the gas used by St. Joseph. One of these lines was carried away by the river about three weeks ago.

(Courtesy "New Business")

Hot Water for the Soldier Boys. 1. Officers' Showers. 2. "A" Battery Ruud Heaters. 3. Another. 4. Men's Showers, Showing One of the Many Uses. See Page Opposite.

I. E. S. PROGRAM.

"Correspondence" Convention Will Present a Dozen Papers.

Plans for the correspondence convention of the Illuminating Engineering Society have been sent out from the general office, 29 West Thirty-ninth street, New York, and include several features of considerable importance to the gas industry. A dozen or more papers have been prepared for this unique convention. It is planned in a few weeks to arange these in groups for release during respectively, September, October and November, and possibly December of 1917. Early in the month of release, copies will be sent to any one who may apply for them to the general office, and will be accompanied by invitation to submit a written discussion. The boards of managers of sections may, if they wish, utilize such papers for section meetings held in the month of release. In some cases it may be possible to have the papers presented by the authors before such meetings. Local representatives also, may, if desired, arange for meetings in their territory, at which the papers may be presented during the month of release. At a date to be fixed, but probably about the 20th of the month, the papers will be released for publication or abstract by the technical press. All discussion of each paper during the month of release, whether delivered at a meeting or submitted in writing to the general office, will be brought together and printed with the paper in the transactions of the society. Further details will be announced later.

The gas lighting industry will be represented in the list of papers by the following:

"Application of Illuminating Engineering to the Gas Industry," R. ff. Pierce (auspices N. C. G. A.).

"Growth and Present Status of Systems Used in the Maintenance of Gas Lamps in Residences," E. B. Myers.

"Lighting of Independence Square, Philadelphia," E. F. Kingsbury.

HEATING BIG BUILDINGS.

Masonic Temples at Vallejo and Petaluma, Calif., Use Rector Gas Radiators.

Gas heating is rapidly coming to the front as a practical method of heating buildings. One notable installation, cited in Pacific Service Magazine, is the New Masonic Temple now nearing completion at Vallejo, Calif. This new

R. ff. Pierce, of I. E. S.

building is a four-story brick building (Class C) 100x100 feet, and in addition to the fraternal halls, etc., will contain a number of rooms for stores and offices. This fine new building will cost $80,000, and will be equipped completely for gas heating. The Rector System, now made by the General Fire Extinguisher Co., of Providence, R. I., will be used throughout and will include a total of sixty-five radiators; a modern all-gas kitchen and water-heating system will also be included. The electric lighting will be supplemented by emergency gas lighting throughout the building. Another building similarly equipped throughout for gas is the Masonic building at Petaluma, Calif.

P. G. & E. Sells 1,426 Ranges and Heaters in 9 Weeks.

June 2, closed the ninth week of the all-gas kitchen campaign of the Pacific Gas & Electric Co., San Francisco. During those nine weeks gas ranges and water heaters numbering 1,426 were sold. The gross amount of sales was $50,094. To make room for some of these 1,426 gas appliances, coal, wood and oil stoves to the number of 405 were hauled from their old haunts and now decorate the rapidly growing junk piles of obsolete appliances.

One Salesman Places 54 Water Heaters in 12 Days.

M. C. Overly of the Syracuse (N. Y.) Lighting Co., sold 54 Automatic gas water heaters recently in 12 days.

U. G. I. Makes An Appreciated Donation to Uncle Sam's Men.

The U. G. I. Co. at Philadelphia, recently installed 33 Automatic Water Heaters, serving 63 shower baths in the Commercial Museum in that city, which the Ninth Regiment of Reserve Engineers is using for its temporary quarters. The installation of the heatters and all gas connections were made without charge to the government.

Employe's Team Work Nets $4,995

The Public Service Gas Co. of New Jersey, has presented striking proof of the value of co-operation by showing the number of sales made to prospects turned in by its Hudson division employes, exclusive of salesmen. During Gas Range Week 137 ranges, 25 water heaters, 25 gas irons, 11 gas lamps, and 5 miscellaneous gas appliances were sold from these tips. The tidy sum of $4,995.74 was hauled in by this team work.

Over 800 Water Heaters Sold at Montreal One Week.

Manager W. B. Johnson and staff of the Montreal (Can.) Light, Heat & Power Co., sold over 800 water heaters during water heater week.

Exterior and Interior View of Laclede Co.'s Canning Exhibit.

Richmond's Banner Week for Range Sales.

G. W. Rhodes, superintendent Henrico County Gas Co., Richmond, Va., reports a highly successful Gas Range Week. The scheme used for this campaign was something entirely new, gotten up by Mr. Rhodes. Four separate sets of folders, having detachable return cards, were made up and mailed direct to the prospects. The first card was mailed four weeks prior to beginning of the campaign, and was in the form of an invitation to the prospect to visit display room and see the ranges now on exhibition. The second card was mailed the following week entitled "A Jewel for You," with description of the ranges to be featured during the coming sale. The third entitled "A Cool Kitchen," described the economy, comfort and many advantages derived by using a cabinet range. The fourth announced the great opportunity that lasts but one week, giving in detail the special prices and terms to be made during this sale. As a result of this campaign thirty-eight cabinet ranges were sold, thus establishing a record for a week there, and incidentally showing an increase of 50 per cent. increase over Gas Range Week Sales of 1916. The picture shows the window display used during Gas Range Week.

Richmond (Va.) Range Window.

Niagara Falls Folk Shift from Coal to Gas.

Niagara Falls, N. Y., is suffering from a gas famine. The number of patrons of the Niagara Falls Gas Co. has increased to such an extent that it is difficult to supply gas to them. The company has 3,000 consumers and a daily output of 190,000 cubic feet of gas, whereas, according to Superintendent A. H. Merritt, the demand would warant the manufacture of 500,000 cubic feet. The company is making temporary provision to relieve the situation to a degree, but no permanent relief is in sight until the new plant can be built. Just now the company is awaiting the pleasure of the public service commission on its application to build this plant.

The unusual demand for gas in Niagara Falls was brought about, according to Mr. Merritt, by the sudden shift of hundreds of housewives from coal to gas on account of the high price of the former.

Industrial Fuel Service Gives Satisfaction.

W. A. Ehlers, industrial fuel specialist of the N. C. G. A., has visited the following towns since June 1: Middletown, Conn.; Utica, N. Y.; Rome, N. Y.; Oswego, N. Y.; Albany, N. Y.; Lewistown, Pa. As an indication of the success with which Mr. Ehlers is inciting, the N. C. G. A. Bulletin gives this list of the installations made in one town during a period of 10 days:

	Cubic feet per month
Gas burners in core ovens	50,000
Oxy-gas cutting torches	30,000
Oxy-gas cutting torches	300,000
Rod-end forge for bolt making	100,000
Tool-making furnaces	250,000
Tool-making forges	200,000
	930,000

The superintendent of this situation has written: "Although our primary object in having Mr. Ehlers visit us was to establish the industrial fuel possibilities, we not only accomplished our object, but on account of his most efficient work, we received orders to proceed with all of the recommendations that he made as far as our present manufacturing facilities will permit. His visit resulted in gas sales amounting to 1,000,000 cubic feet per month. The data secured from his service will be an invaluable guide to us in planning additions to our manufacturing and distribution equipment."

Mr. Ehlers will spend all of July at Springfield, Mo., in the service of the gas company there.

Eastern Shore G. & E. Co. Installs Additional Equipment.

The Eastern Shore Gas & Electric Co. is preparing to install additional machinery and engines at Towson, Md., for the purposes of taking care of increased contracts.

Rochester, Minn., Gas Service is Being Improved.

The Rochester (Minn.) Light, Heat & Power Co., which recently was acquired by the Runyan-Ryall syndicate will lay new 8-inch mains and install a new bench.

Red Cross Window by Mgr. Campbell at Benton Harbor, Mich.

Piping Buildings for Gas

Remodeling of 30,000 Old New York Residences Prompts Robt. Livingston, of Consolidated Gas Co. to Ask Architects Their Opinions on This Subject

The New York legislature, having passed a law which will permit the remodeling of over 30,000 old but substantial residences in the city of New York, Robt. Livingston, publicity manager for the New York Consolidated Gas Co., has set on foot a movement to insure these modernized buildings being properly supplied with gas.

"Experience has shown in the past," says Mr. Livingston in the *Real Estate Bulletin*, "that where small private dwellings have become small apartment houses, housing two or three families, 'cookers' and gas ranges on the upper floors have not had the necessary supply of gas, and this frequently has led to complaints by tenants on the upper floors. Investigation has shown that three gas ranges, as well as the lighting of the premises, have depended on gas pipes of too small dimensions. In other words, three tenants were found to be drawing on gas for cooking and lighting when the piping was intended for one gas range, and that in the basement and only for lighting in the upper part of the building. As the gas companies have no control over the piping in a building, the only remedy could come through the landlords installing larger pipes, even though the gas companies were anxious to do all in their power to give the complaining tenants relief. It would be well for the owners of the small buildings now to be converted into three-family houses, to bear this in mind. So far as the gas companies are concerned, they always are ready to render assistance to the property owners by advising them as to the required sizes of gas pipes to take care of the gas ranges as well as the lighting. The expense is inconsiderable, and the work should be done while the premises are being remodeled. In all probability many of these apartments also will be gas heated, and this, too, should be borne in mind by the owners of the properties. The present coal situation and the fault many tenants recently found at being deprived of their necessary hot water supply, should lead to provision being made for both of these necessities. Many new buildings that, unfortunately, were not piped for gas, recently have had gas pipes installed to insure proper heating by gas, in many cases as auxiliary to their central heating system, and to furnish tenants with their hot water supply."

To reinforce his advice, Mr. Livingston secured opinions of several New York architects and builders, regarding the piping of buildings and from these we quote the following:

Albert B. Ashforth—Thinks all buildings should be piped for gas, especially in view of the heating problem in its relation to the cost of coal. He is having it done in certain buildings controlled by him (44th street). In some other buildings he has been obliged to put it in for tenants. Recommends it for all new buildings. Did not especially mention apartments.

Lawrence B. Elliman, of Pease & Elliman—Approves of the proposition generally.

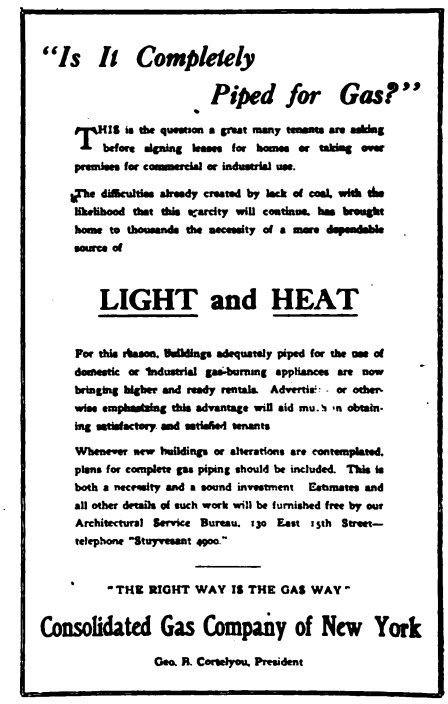
M. D. Littlefield, of Douglas Robinson, Charles S. Brown & Company (member Building Managers' Assn.)—Does not recommend it for new buildings. Thinks lofts should always be piped. Thinks there are no available combination fixtures for apartments and not necessary except in kitchens. Thinks the gas heater installation (referred to in your Record and Guide ad. of Saturday, the 16th) a good auxiliary, in view of the cost of coal, both for apartments and new buildings where hot water is furnished, unless the heaters are too expensive, as in large buildings.

E. P. Doyle, Vice-President Realty Notice Corp'n—Thinks general piping for gas is a good idea, especially in light manufacturing and manufacturing buildings. The coal situation has an important bearing.

B. E. Martin (former president, New York Building Managers' Ass'n)—Thinks all new buildings should be piped for gas. In an office building, for instance, if the plant had to be shut down for repairs, gas would be very convenient. Also, if only a few tenants in the building worked at night, the electric plant could be shut down and the gas used by those tenants at great saving to the owner. He knows of no instance where the lack of piping militated against the renting of a building. In case of a shortage of coal, it would be of great advantage to have all buildings piped for gas.

H. H. Murdock, of Jardine, Hill & Murdock, architects—"In my judgment it is a very desirable thing to carry a gas riser into all business and office buildings. This can be very easily accomplished at a minimum expense by simply carrying one feed line up through the building with branches at each story so that gas is available at any floor when it is required. Numerous instances have come to my attention in our own experience where this foresight has proved desirable."

In addition to his article, embracing the foregoing features, Mr. Livingston also carries the following full-page advertisement in the *Real Estate Bulletin*:



"Is It Completely Piped for Gas?"

THIS is the question a great many tenants are asking before signing leases for homes or taking over premises for commercial or industrial use.

The difficulties already created by lack of coal, with the likelihood that this scarcity will continue, has brought home to thousands the necessity of a more dependable source of

LIGHT and HEAT

For this reason, Buildings adequately piped for the use of domestic or industrial gas-burning appliances are now bringing higher and ready rentals. Advertising or otherwise emphasizing this advantage will aid much in obtaining satisfactory and satisfied tenants

Whenever new buildings or alterations are contemplated, plans for complete gas piping should be included. This is both a necessity and a sound investment. Estimates and all other details of such work will be furnished free by our Architectural Service Bureau, 130 East 15th Street—telephone "Stuyvesant 4900."

"THE RIGHT WAY IS THE GAS WAY"

Consolidated Gas Company of New York

Geo. B. Cortelyou, President

Ad on Piping Buildings.

Untangling Ironwood and Iron Mountain (Mich.) Gas Affairs.

The Michigan Railroad Commission is to issue a statement to holders of securities in the Ironwood (Mich.) Gas Co. and the Iron Mountain (Mich.) Light & Heat Co., for which the Union Trust Co. of Detroit is trustee and receiver. The statement will ask that all bonds be placed in the hands of some state official, likely the state treasurer, so that affairs of the two companies can be properly straightened out.

The More Gas Consumed, the Higher the Rate.

The East Ohio Gas Co. has submitted a new nine-year franchise to the Cleveland council providing, for a raise in rates—an increase in price the more gas that is used. The new schedule follows: First 5,000 cu. ft., per month, 43 cents per thousand; next 5,000 cu. ft., 48 cents; all over 10,000 cu. ft., 53 cents; subject to a discount of 3 cents per thousand if paid on or before the 10th day of the month. In event a consumer uses less than 2,000 ft., any month, the company shall be permitted to charge a minimum bill equivalent to the maximum price for the first 2,000 ft. (80 cents), irrespective of the amount consumed.

CURRENT ADVERTISING REVIEW

The advertising possibilities in the new Humphrey "Radiantfire" are indicated in the poster design run recently by the Laclede Gas Light Co., of St. Louis, in the St. Louis Art League's book. A reproduction of this design is shown herewith. This is real

Laclede "Radiantfire" Ad.

art in advertising, and it proves conclusively that gas appliances can be used as well as any other commodity for artistic effort and effect. But this "Radiantfire" seems to have stepped out somewhat in front of other appliances as models for regular artists. Perhaps this is on account of its special fitness for artistic environment.

The Peoples Gas Light & Coke Co., Chicago, through its live and active hotel and restaurant department, of which Ivan Hoy is manager, has published and circulated among the bakers of Chicago a handsome booklet on small, self-operating steam boilers the company has evolved for supplying steam to bakers' ovens. The booklet contains complete data showing the advantages and efficiency of these boilers, which are in size from one and a half h. p. to ten h. p. Many users of this new gas appliance have given Mr. Hoy glowing testimonials on the boilers and after reading the bunch it seems as though the steam troubles of Chicago bakers are all over.

The British Commercial Gas Ass'n never permits a chance for pertinent publicity to escape. In addition to co-operating closely with the English Food Controller, the B. C. G. A. is tying its advertising with the "Baby Week" national campaign. The advertising material furnished the members of the association is a very important contribution to child welfare literature. The line illustrations used in these ads are masterpieces. The illustrations for the "Watching Mother" and "Baby's Bath" ads tell effective sales stories in themselves.

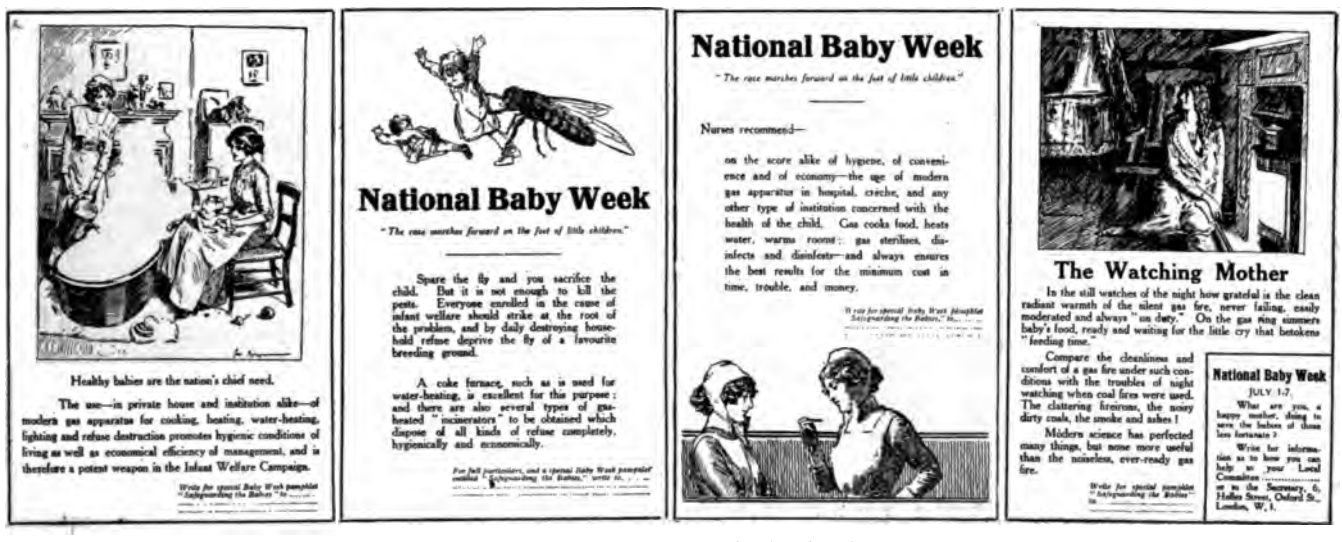
From its damned and maligned position as a disturber of the "city beautiful" schemes, the gas holder has stepped into honor. S. J. Franklin's fellow citizens at Millville, N. J., after a stirring patriotic ceremony, hoisted a huge American flag above what was considered the most conspicuous object in the city—the gas holder. There it waves reassuringly over the bright homes and busy workshops beneath it. Could there be a more fitting location

Chicago Incinerator Ad.

for our emblem? The strength and dignity of the holder, maintained high by the unceasing labors of hundreds beneath it, supply a substantial symbolism for the national emblem.

It might be well for all companies to study the possibilities for making the old holder more attractive.

patriotic activities in Nebraska.



Example of Timely Advertising by British Gas Assn.

NATURAL GAS DEVELOPMENTS

GROSSCUP ELECTED.

West Virginia Association Meets Next Year at Huntington.

The West Virginia Natural Gas Association closed its second annual convention at Wheeling, July 13th. Officers were chosen for the year, as follows: President, Fred Paul Grosscup, of Charleston; vice-president, E. G. Davison, of Crawfords; secretary-treasurer, Edwin Robinson, of Fairmont; new directors, George B. Riddle, of Wheeling; Pat McDonough, of Parkersburg; E. J. King, of Huntington, and Lyman S. Horner, of Clarksburg.

The convention will meet next year at Huntington. Eight hundred were registered in attendance at the convention. A barbecue at the fair grounds was the closing feature.

Union Gas & Electric Increases Gross Earnings.

Gross earnings of the Union Gas and Electric Co., of Cincinnati, for the three months ending June 30, amounting to $619,721.08, exceeded those of the corresponding period of 1916 by more than $42,000, according to the statement filed with City Auditor William Leimann. Enclosed was a check for $3,098.60, representing the one-half of one per cent. franchise tax payable to the city.

Kansas Natural Rate Case is Ended.

The hearing of the Kansas Natural Gas Co.'s rate case in the federal court at Kansas City, Kas., has virtually ended. The development of interest to cities served by the company occurred when Judge Wilbur F. Booth issued a statement from the bench to the effect that all cities on the system of the Kansas Natural Gas company would be supplied with a proportional share of natural gas at a certain rate.

This means, it is understood, that the company will deliver natural gas to the cities at a rate to be decided later by the court. In case any company makes no demand for gas at this rate, the service will be discontinued.

To Make Gasoline From Natural Gas.

A half million dollars is being spent in the erection of a plant near Lorain, O., by the Logan Gas & Fuel Co., of Pittsburgh, which plans to extract gasoline from natural gas. The company owns a number of gas fields in that vicinity. Four large steel and concrete buildings will house compressor and extracting machinery. The gasoline is obtained by heating the gas in the compressors, suddenly chilling it, and then pumping it through water-cooled extractors.

Urges Injunction for Gas Use in Factories.

An injunction against the East Ohio Gas Co. to prevent it from supplying gas to factories, except where government orders are being filled, was urged by a councilman recently as the only way to insure gas for private consumers next winter.

Cleveland gas engine manufacturers protested to state public utilities commission against the plan of gas companies to cut off the supply for engines.

Natural Gas Supply Available for London (Can.) Manufacturers.

The Utilities Commission of London, Ont., has contracted with the Southern Ontario Gas Co. for a million feet a day of natural gas at 20 cents per thousand. Half the supply is for the McClary Manufacturing Co., which pays for the pipe line, and the rest will be available for manufacturers at 10 per cent. over cost.

New Wilson, Okla. Added To Ardmore Natural Gas Circuit.

The Consumers Light & Power Co., of Ardmore, Okla., has completed gas mains from the Gypsy oil and gas field north of Ringling to New Wilson. This town is to be supplied from the principal main extending from the big Gypsy gasser and supplying Ringling, Healdton, Wirt and Ardmore.

Cosden & Co., Baltimore, Md., have applied for a charter. Capital stock, $32,000,000. To produce, prepare, refine and market petroleum and natural gas in all forms. Incorporators. Enos S. Stockbridge, Wilhelm Lentz, Roland H. Brady, all of Baltimore.

New Pumping Station and Pipe Line for Peoples Gas Co.

The Peoples Gas Co. of Pittsburgh, has leased ground from W. H. R. Hoge, near Waynesburg, Pa., on which a gas pumping station will be erected. The work of construction will be started soon. Four miles of eight-inch line must be laid, besides a considerable amount of smaller pipe.

Hamilton, O., Votes $40,000 in Gas Plant Improvements.

Hamilton, O., has appropriated $40.-000 for extension and improvement of the city's natural gas system. The money is derived from a $40,000 bond issue recently purchased by the city sinking fund. Of this amount $10,000 will be spent for four inch pipe and $6,000 for service pipe. Money also is provided for recaulking gas mains.

The Corn Planter Refining Co.'s interests have been disposed of to the Ohio Cities Gas Co. for $2,000,000. The company maintains a chain of supply stations throughout the east.

Western States G. & E. Co. Has $281,084 for Dividends.

Byllesby's Western States Gas and Electric Co. earned bond interest 2.53 times during the year ended May 31, 1917, total net earning being $620,185, a gain of $37,981 over the net for the previous twelve months. Balance after bond interest was $374,924. After deducting interest on the company's 6 per cent. ten-year notes, there remained available for dividends $281,084.

Treasurer Clifford Given Token of Esteem.

At the meeting of the directors of the Association of Natural Gas Supply Men, held in the William Penn Hotel, Pittsburgh, on July 17, T. C. Clifford, who has acted as treasurer of the association since its organization, was presented by the directors with a handsome hall clock, as a mark of appreciation for the excellent manner in which he has handled the finances. Twenty-three additional manufacturers have joined the association within the past year, and the report shows that, after all expenses of the Buffalo convention had been paid, the surplus had been increased about $500. Treasurer Clifford reported that he had invested $2,500 of the surplus in Liberty Bonds.

Bond Department Branch in Toledo Now Open.

The bond department of Henry L. Doherty & Co. has opened a branch office in Toledo, O., in charge of Walter J. Young, formerly power salesman of the new business department of the Toledo Railway & Light Co.

OPINIONS *AND* COMMENTS

PUT ASIDE SELF.

This is no time for selfish motives. The gas man, whether he be editor, operator or employe, who can't suppress his mercenary ego long enough to let the industry and the government concentrate a few months on winning the war, is, in our opinion, a rather poor sort of patriot.

Two big conventions this fall might put a few more dollars' worth of advertising into some papers which depend upon convention spiels for their allurements but the directors of the A. G. I. & N. C. G. A. have decided that gas men can not be spared from their work this fall to attend conventions—and THE RECORD abides by their judgment. Meanwhile it may be well to remember that the excellent papers that had been scheduled are to be given thorough circulation through the real gas journals and the field will not be deprived of those important convention features.

Now, let's shut up about conventons.

WAR'S LESSON.

Physically, as Sir George Paish remarked of England, the United States doubtless will suffer greatly. Mentally, the Metallurgical and Chemical Review suggests, we have acquired a great deal but what we have acquired will be no gain unless we use it. It will be of no more economic value than an unworked patent. Many bad habits have been acquired. Workmen, given wages at undreamed of rates, have become extravagant. Many business men who acquired wealth have dreamed of the ease and luxury that would follow their few years of stress. Our own entrance into the war will largely prove an antidote to these infections. Everyone must work harder and we must endeavor to make materially productive the new ideas the war has given us. Our economic position has been impaired, and work, to balance the waste, is the only thing that will restore it. There is no occasion to worry about the situation immediately after the war. Experience shows that what are called "good times" always follow war.

BUSINESS AS USUAL!

When some one continues advertising,
Some one continues buying.

When some one continues buying,
Some one continues selling.

When some one continues selling,
Some one continues making.

When some one continues making,
Some one continues earning.

When every one continues earning,
Every one continues buying.

J. J. Geisinger.

The GAS RECORD

MONADNOCK BLOCK, CHICAGO, U. S. A.

W. H. Graffis . . . . . *President*
H. D. Fargo . . . . . *Vice-President*
H. B. McMeal . . . . . *Secretary*
Herbert Graffis . *Treas. and Adv. Manager*
Milt Saul . . . . *Vice-Pres. and Editor*
Walter V. Turner . . . *Technical Editor*

SUBSCRIPTIONS

The subscription price of THE GAS RECORD is $2 a year in the United States, Cuba and Mexico; in Canada it is $3; in all other countries, $4; single copies, U. S. A., 25 cents.

ADVERTISING

THE GAS RECORD is issued the 2nd and 4th Wednesdays of each month. Copy can be accepted as late as the Monday previous to each issue. Where proof must be seen, allow ample time for transmission in the mails.

	Yearly Rate 24 issues	6 mos. Rate 12 issues	3 mos. Rate 6 issues	Less than 6 issues
Full Page, per issue	$40.00	$46.50	$50.00	$54.00
Half Page, per issue	22.00	25.00	27.00	29.00
Fourth Page, per issue ...	12.00	14.50	16.00	18.00
Eighth Page, per issue ...	7.00	8.00	9.00	10.00
Sixteenth Page, per issue .	4.00	4.50	5.00	6.00

Classified Advertising — "Wants," "For Sales," etc.—5 cents a word per insertion, minimum charge $1.

Entered as second-class matter at the post office at Chicago, Illinois, under the act of March 3, 1879.

Vol. 12 No. 2 — CHICAGO — July 25 1917

WHO TO EXEMPT.

The question of what men should be exempted from the draft and what ones may be allowed to go, becomes of urgent importance to every gas company. As stated in the news pages of this issue, the government is anxious that the gas business be not crippled. Our industry can be of vastly greater aid to both military and civic operations today than ever before. And yet, it is the patriotic duty of every gas manager to study his list of employes carefully and consider thoroughly just who can be spared and who cannot. In a general way it may be assumed that the framework of the organization should not be wrecked. The men who are essential—the men who cannot be replaced by older, inexperienced men or women — should be retained. Speaking along these lines at Keokuk, Ia., on June 19, C. W. Kellogg said:

> "There are two ways to offset the shortage produced by the combined effect of war munition requirements and the taking of men for the active service. One is to eliminate all useless or the less useful work; the second is to enlarge the category of those who perform the nation's work. The latter means, of course, the employment of women wherever they can replace men, or the employment of older men to do work for which they are physically fitted. In England the government has prepared a long list of trades, in which, during the war, it is absolutely prohibited by law to employ males. This list contains seventy kinds of industry, but a typical set includes: French polishing, china manufacture, millinery, bookbinding, manufacture of wall paper, candy, beer, church organs and bricks. You can see at a glance that these are works which can be dispensed with for the good of the nation when the need exists. It has been stated, from statistics carefully compiled, that 2,000,

000 women in England now are doing work which before the war was done by men. In the United States a corresponding number per capita would be 6,000,000, since our population is three times as great as England's"

We do not know at present that it will be necessary to employ women on an extensive scale in the industries of the United States but the sales department, clerical force and meter reading roster apparently offer opportunities for experimentation. Installation of labor-saving machinery for handling coal, coke and ashes; the use of automatic stokers and kindred apparatus may also release many men for service who could not otherwise be spared. War is a wonderful stimulus to resourcefulness as well as to sacrifice and it is up to each and all of us to do our part thoroughy and well.

PROFITS.

One of the hardest problems to deal with at this juncture, in the routine of gas company business, is that of profits. What basis can be used for arriving at a proper selling price for both gas, and gas appliances? In the item of gas itself, there is grave concern throughout the industry, for rates on this commodity are fixed by state or city authorities and any change in existing schedules must be fought for vigorously in the face of public opposition. The necessary machinery to adjust gas rates to existing conditions is already in motion in many localities and it is to be hoped the legal departments of gas companies generally may eventually win their contentions and secure a fair adjustment of rates, based on the rising costs of raw materials that go into the manufacture of gas.

In the item of appliances, a different situation exists. Gas companies have the fixing of selling prices for these necessary articles in their own hands. What profits shall they take from them? Naturally, there is occasion for higher selling costs than heretofore, in view of the higher costs of manufacture due to scarcity and high prices of labor and raw materials. But where shall the ascending price halt? It has been customary with many companies to take the manufacturers' prices on appliances, add a certain percentage to take care of overhead, another for miscellaneous expenses, and then ask consumers for a price equal to the total of these items. Would it be fair in these times and conditions to ask more than that?

Those who fix selling prices to consumers must also take into consideration the situation of the manufacturer. He cannot continue to make his products under his present difficulties unless the gas companies continue to relay them to the ultimate consumer with the least possible delays. Can the companies do this with excessive selling prices fixed on the appliances? This is a factor of the business that calls for careful and patriotic consideration. We do not believe there are very many gas companies in this country that will knowingly extort excessive profits from their customers. The very nature of the business forbids any such practice. But if there be any at all, we are constrained to quote for their benefit the words of President Wilson, on this subject. He said not long ago:

"Patriotism leaves profits out of the question. In these days of our supreme trial, when we are sending hundreds of thousands of our young men across the seas to serve a great cause, no true man who stays behind to work for them and sustain them by his labor will ask himself what he is personally going to make out of that labor. No true patriot will permit himself to take toll of their heroism in money or seek to grow rich by the shedding of their blood. He will give as freely and with as unstinted self-sacrifice as they. When they are giving their lives will he not give at least his money?"

The editor of the Washington (D. C.), Times has added the significant statement that "when Wilson says that patriotism and blood money profits must be kept separated, the people know that he means it."

> The two great factors in fighting a war are men and money. When, as in the present war, men, in hundreds of thousands, are taken for the army and navy and money in billions is needed to supply and equip them, the natural result is to make labor for any other purpose ever scarcer as the war progresses, and to make capital for any other purpose both scarce and high. By the same line of reasoning, any use of either labor or capital for any purpose other than military, not absolutely needed durng the war, is an unpatriotic act. The war has suddenly produced a change in point of view, way of life and prospects, as radical as ever happened to this nation. Modern war requires the co-operation of each individual, as it never did before. We should dedicate every thought and effort to this one end, until the war is won. The nation must come first in every consideration of policy; in every question between two alternative courses of action.
> —C. W. Kellogg.

ORDER HEATERS NOW.

Gas company managements should take into consideration the questions of shortage in raw materials and difficulties attending shipment when they come to buy their fall line of heating appliances this year. Of course, this is "old stuff" in the way of advice, at least to some of the alert managers, but nevertheless, we are reliably informed by manufacturers that a great majority of gas companies in this country have not yet placed any orders at all for heating appliances, while many have merely ordered samples of the 1917 lines.

The heating appliance makers are strictly up against a hard proposition this fall. The supplies of steel, sheet iron and copper are limited. Labor conditions are unsettled, and promise to be still more so as the execution of the terms of the selective draft law proceeds. These, with other difficulties under which the factories are operating, including the congested freight situation, make it extremely unlikely that "eleventh hour" orders can be filled with that promptness the gas companies have come to expect of the manufacturer.

By far the best policy to pursue is the early order plan. Get busy now—today—on the job of determining how many heating appliances are to be sold this fall and winter. Consider in this item the high prices and the scarcity of coal, and the consequent opportunities there will be for gas as heating fuel. Once the estimate is made up, shoot it in to the manufacturer. He will do his best to fill the order and in nine plants out of ten the shipments will arrive in plenty of time for fall sales.

But the time to order is—now.

Gas Man's Notes on the War

C. W. Hunter, Gas Engineer for Stone & Webster Discusses War Uses of the By-Products of Gas and Coke Manufacture in the Company's Journal

One of the leading British generals commented in a recent article that while the principles of strategy in war have remained the same since earliest history, the tactics change to suit the offensive and defensive weapons created from time to time by human inventive genius. Probably one of the most prominent features of the great war is the enormous use of artillery and the terribly destructive effects of the modern high explosives. A very great development in guns and explosives has taken place in the last forty or fifty years, which has had a revolutionizing effect on the methods of attack and defense. Formerly, the permanent defenses of large cities and strategic points were elaborate and expensive structures designed with the idea of being strong enough to resist material damage by artillery fire. This idea has apparently influenced the design of many fortresses of continental Europe, where the military engineers have adopted various modern materials and devices such as armor plate, reinforced concrete, movable turrets, etc., to accomplish their ends. The comparative ease with which the heavy German artillery reduced the defenses of Liege, Antwerp and other towns in the early months of the present war, and the destructive effect of the bursting charges of their shells on armor and concrete, as illustrated by photographs published in various papers, showed that the development in the manufacture of high explosives had forced another change in military design and tactics and had given the ascendency for the time being, at least, to the modern school of fortification design which relies on more or less simple form of trenches and field works which may be quickly and inexpensively constructed and are designed primarily for a mobile defense.

By-Products of Gas.

The maintenance of the fighting power of an army in the zone of operations in modern warfare demands a transport system possessing speed and reliability surpassing all previous conceptions. This has been worked out in Europe by the adoption of the motor truck, which has been used in such great numbers that the consumption of fuel for army transport alone is enormous. In countries which do not produce petroleum from which gasoline may be made, it is necessary to turn to some other source of supply.

Also, the factor of the productiveness of the soil of the various belligerent nations, has reached a point of paramount importance. In the densely populated countries on the continent, whose soils have been intensely cultivated for centuries, the need of artificial fertilization is imperative.

In each of these three fields of usefulness in war time, many of the necessary raw materials or finished products are produced in the industry of the manufacture of gas and coke.

From it are obtained the bases of several of the most important high explosives, a motor fuel containing a greater power for a given bulk than gasoline, and a fertilizer containing a high percentage of available nitrogen, besides many other materials less directly applicable to military operations. It seems not too much to say that without its gas plants and coke ovens, Germany would have been forced to terms long ago.

Modern Explosives.

From the standpoint of the technique of their use, modern explosives are divided into three general classes, propellants, blasting powders and detonators. Propellant explosives are also termed "progressive," because the explosive reaction proceeds progressively through the charge and requires an appreciable length of time to consume it. The rate of explosion can be controlled to a certain extent by varying the chemical composition and size and shape of the powder grains, so that when used in a gun as a propelling charge for a shell the explosive will be consumed gradually, occupying all, or nearly all of the time taken up by the passage of the projectile through the bore of the gun. It is stated that in our 3-inch field gun this time is about 2/10 of a second. The advantage of this characteristic of propellant powders is that the required velocity is imparted to the shell without the excessive pressure on the gun which would result from a practically instantaneous explosion.

In blasting powders, the explosive reaction is of a different nature. It is supposed to progress through the mass at a very rapid rate (17,000-21,000 feet per second in the case of gun cotton) in a radial direction from the point of initiation. The disruptive pressure exerted is very high and these powders are used for blasting or for bursting charges for artillery shells.

In the third class of explosives, the reaction is practically instantaneous, producing a still more brusque effect than in the blasting powders. They are used only for initiating explosions in other material.

By-products from the manufacture of coal gas and to a less extent water gas, form the base of a number of explosives of the second class mentioned. An explosive reaction is of the same general nature as ordinary combustion and an explosive mixture or compound must contain two essential ingredients, an oxygen supplier and a combustible. When such a substance contains these components in the proper proportion to form the ordinary products of combustion and has at the same time a weak molecular structure due to the presence of a substance of weak molecular bonds, it may become an explosive. In gas made by the modern process of distillation or coking of coal in by-product ovens or gas retorts, there occurs in the form of vapor the series of hydro-carbon known as the "benzols" which contain the combustibles, hydrogen and carbon. If these materials are treated in the proper manner with nitric and sulphuric acids, they form chemical compounds containing the "radicle" NO_2, which has an exceptionally weak structure and will give up its oxygen at a sufficiently rapid rate to cause the compound to explode with powerful effect when the reaction is initiated by the proper conditions of heat, shock, etc. From a military point of view the most important explosives formed from the "benzols" are picric acid and tri-nitro-toluol, usually termed T. N. T. in this country.

Picric Acid.

Picric acid is manufactured by nitrating phenol, one of the components of coal tar. In time of war, the production of phenol from this source would be too small to meet the demand and consequently synthetic phenol is made from benzol, which is re-

covered from illuminating gas by absorption with a high boiling point oil possessing certain characteristics.

Picric acid was first used as an explosive in 1871; it was known as a poison and a dye long before its explosive properties were recognized. Its chief advantages for military purposes are its powerful effect, and when pure and properly used, its stability and insensitiveness. The modern high explosive which is to be used as a bursting charge for shells must be able to meet very rigid requirements—in fact, some of the characteristics demanded seem to be almost contradictory. For instance, while it must respond at the proper time to its own fuse the explosive must be able to stand without detonation the shocks of handling and transportation and also those of the discharge from the base of the gun and impact of the shell on the obstacle. The not unusual popular idea that the usefulness of a powder is measured by the ease of detonation is misleading. Many explosive substances are not allowed to be transported on railroads on account of their sensitiveness and are therefore eliminated from service.

One of the objectionable characteristics of picric acid is its property of combining with metals, especially iron and lead, to form "picrates" which are very sensitive. This makes it necessary to coat the inside of shells, which are to be filled with this material, with non-metallic paint; obviously, if this is not properly done and the filler and shell are brought in contact, sensitive compounds may be formed which may prematurely explode and in turn detonate the charge with disastrous results. Another objectionable property of picric is its high melting point (about 250 degrees F.). As it is usually desirable in filling, to melt the material and pour into the shell in order to secure greater density of loading and consequently increase the explosive effect, a substance with high melting point entails certain risks in handling. While picric may be decomposed by heat into vapors which may be burned without exploding if properly manipulated, a sudden application of a large amount of heat is apt to set it off. To eliminate this danger, various substances have been mixed with it to reduce its melting point, the compounds forming the service high explosives of various nations under the name of Lyddite, Melinite, Schimose, Ecrasite, etc.

Tri-nitro-toluol.

Tri-nitro-toluol, which is manufactured by nitrating toluol, a very close cousin to benzol and occurring with it in coal gas and water gas, does not possess some of the dangerous features of picric and therefore has come into favor in recent years. Its melting point when pure is about 147 degrees F., it does not give off noxious fumes when melting, is less sensitive than picric and does not form compounds with metals, so that it may be used directly as filler for high explosive shells without special preparation. It is not as powerful as picric but this is claimed to be an advantage, under the supposition that the former blows its shell into minute pieces which are too fine to be effective as shrapnel.

Many attempts have been made to utilize the explosive qualities of the "picrates" or compounds of picric acid, the only one which has met with any success being ammonium picrate, which is stable and comparatively insensitive. In the case of this material, not only the base of the picric acid, but also the ammonia, is a direct by-product of coal gas. Its property of absorbing moisture, which lowers or completely destroys its explosive character, has limited its use to mixtures with other ingredients. It was reported in the papers recently that the largest military mine prepared so far was set off by the British in the battle of Messines Ridge, the explosive used being "Ammonal" which is stated to be a mixture of ammonium picrate and powdered aluminum, with other minor substances, the aluminum being added to prevent the absorption of moisture.

It may be remarked that benzol and toluol are important constituents of illuminating gas as they are responsible for a large part of its illuminating power and to the extent of perhaps five to seven per cent. of its heating value. When the gas is generated in coke ovens and used for heating the ovens themselves or in the process of steel manufacture, the reduction in quality is immaterial to the company as compared to the value of the benzols as by-products. When, however, the gas is distributed to the public under state requirements as to its heat value or candle-power if the benzols are removed, it may be necessary to re-enrich it, or to arrange for some modification of the quality specifications. In this country, up to a short time ago, practically all of the benzols used for explosives were recovered from coke oven gas not subject to public use. Any great increase in the demand would mean that all gas companies of moderate size or larger would have to install apparatus for the recovery of toluol and possibly benzol—in fact, a few of the larger undertakings have already done so. As re-enrichment of the gas is an expensive matter, if it is necessary in a time of national emergency to abstract these materials from city gas, some adjustment will have to be made between the gas companies, the consumers and the government. It would seem that in anticipation of such an emergency, a start should be made on the settlement of this question. While most of the English gas companies are now recovering benzols, it was only after much discussion and not until August, 1916, two years after war was declared, that parliament passed an act containing provisions by which any gas company operating by virtue of a parliamentary order could legally apply for a change in its standards so as to permit extraction of benzol.

Application of Benzol.

Besides being a base for several modern explosives benzol finds a direct application in war as fuel for engines of motor trucks for army transport, etc. It is stated to yield 25 per cent. more power than gasoline. In the United States, the development of the petroleum industry has made gasoline the practically universal motor fuel. As early as 1910, however, it is reported that one-half the benzol output of Germany was used for this purpose and during the war it has been indispensable to them. Since 1914, many benzol recovery plants have been installed in the coke oven and gas plants of this country, and in many, if not all cases, the cost of the plant has been written off out of the profits received during the period of high prices. When the war ends, these will be idle unless a market is developed for their output. Under the existing conditions, it is not unlikely that benzol can be sold at a price which will compete with gasoline and that it will be largely adopted as a fuel for commercial trucks, if not for pleasure cars.

It is curious that nitrogen, the practically indispensable agent in the formation of many explosives by which men destroy each other, is also the indispensable element for the nourishment of plant life, by which men live. The present war seems to be developing into a contest of food production and again the by-products of the gas industry are of assistance to the nations by furnishing nitrogen available for the intensive cultivation of the soil, in the form of ammonia. In the process of generating coal gas, part of the nitrogen of the original coal combines with hydrogen and appears in the gas as ammonia, which may be readily recovered by absorptions with water. Usually the ammonia is treated with sulphuric acid to form ammonium sulphate, which is the principal nitrogen bearing component of many fertilizers. The amount thus furnished is not by

any means sufficient to supply all the needs of fertilization but it forms an important part of the nation's supply.

Minor Uses for By-Products.

There are many minor uses for coal gas by-products which are directly or indirectly needed in war as well as peace, such as the nitration products of napthalene as ingredients for "safety" explosives, other applications of benzol derivatives for the same purpose, the many drug and dye bases, preservatives and building materials made from coal tar, etc. It seems hardly necessary to mention the importance of coke in the manufacture of steel and the necessity of gas for many domestic purposes as well as industrial heating processes, especially in munition manufacture. It would seem, however, that one of the characteristics of the business is its adaptability to peace or war time conditions; in the list of "occupations" indispensable in the conduct of war it can claim a place amongst the first.

French Winning Back Big Coal and Coke Territory.

The pushing back of the Germans from the neighborhood of Loos and Lens opens up the prospect of the recovery to our French allies of a very important coal and coke producing area, though no doubt it will mean in the case of some plants that a great deal of restoration work first will have to be done. M. Reumaux, managing director of the Lens Co., estimates it will take from eight months to a year to get the pits in working order. This company's concessions, according to the "Iron and Coal Trades Review," comprise 17,147 acres. In 1912 there were 16 pits at work, eight washeries, 584 by-product coke ovens, 80 coke ovens without recovery of by-products, three ordinary briquetting presses, and one press for making egg-shaped briquettes. The output in 1912 totalled 3,908,000 tons of coal, 666,172 tons of coke, and 142,423 tons of briquettes. The Courrieres Co.'s concessions in 1912 covered 13,490 acres, with 10 pits at work and one unfinished. The total output of coal was 3,096,113 tons, and the number of employes 4,494, including officials. There is also the Compagnie des Mines de Drocourt, which had 6,289 acres in 1912, with three working pits, a washery, and 75 Solvay coke ovens with by-product recovery. The output was 619,480 tons of coal and 79,060 tons of coke, and the number of work people 3,332. In 1912 the Bethune concern's concession at Grenay comprised 15,696 acres; the company had 11 working pits, a washery and 346 coke ovens at Bully-les-Mines, and a briquetting plant at Violaine. The output in 1912 amounted to 2,309,148 tons of coal (63,200 of this anthracite coal) and 345,776 tons of coke. The number of workmen was 10,247. The Lievin Co.—Societe Houillere de Lieven—had no coke ovens, but had an annual coal output of over 2,000,000 tons, all of which went away by rail or canal.

Waste of Coal

Bureau of Mines Director Urges Reform in Present Methods of Firing

Fully half a billion dollars, or one-fourth the issue of the Liberty Loan bond, was wasted last year in this country through the inefficient use of coal, according to Van. H. Manning, director of the bureau of mines, Department of the Interior. He further declared that this waste was continuing at an even greater rate and at a much larger penalty to the country because of the increase in the price of coal.

"The penalty is not only a heavy tax on the American pocketbook," said Mr. Manning, "but it is also an unpatriotic thing, for every pound of coal we waste there is that much less available to put into energy to end the war. Last year the United States mined six hundred million tons of coal, the greatest production every witnessed in the world, and of this amount we wasted one hundred and fifty million tons, or twenty-five per cent., through inefficient use. As an example, in the modern, efficient power plants of the country twenty per cent. of the heat in the coal consumed is converted into power, whereas in the small power stations the efficiency frequently drops below ten per cent. Although the average efficiency of all kinds of steam-power plants in the United States can be only a matter of guess-work, it is quite probable that the average is somewhere in the neighborhood of five or six per cent. of the energy of the coal transformed into useful energy ready for distribution. So you can see that, if it were possible to elevate the average efficiency to something near the maximum now attainable in steam plants, about three times as much energy would be available for the productive industries of the country.

Regarding New Equipment.

"You will find business men, however, making the statement that in order to attain these savings it will be necessary to put in new equipment, and that this is not the time for changes with the factories working at their maximum to supply the materials needed in the war. This is partly true, but there is hardly a manufacturing establishment in the country which can not, with a certain amount of care and supervision in its furnace room, use much less coal and obtain much greater results. Owing to the great abundance of coal here, in the past the manufacturer has paid but little attention to the amount of coal he burned or how it was burned. In addition, technical training in our colleges has placed relatively small emphasis on the principles and the processes of combustion, concentrating their attention rather upon the improvement of the engine. The more evident facts of combustion seemed so simple as to offer little inducement for an intensive study of the process, but, as a matter of fact, the burning of a fuel is by no means a simple process, and the misconceptions that have resulted from a too casual study of the phenomena have led engineers to construct uneconomical and inefficient devices. The nature of coal has also been misunderstood by many users. Coal is an extremely complex substance, behaving quite differently under different conditions of combustion, and as the United States is extremely rich in a great variety of mineral fuels, it would seem necessary that the furnace design should vary with the different fuels used.

Reports of Value.

"The bureau of mines has for a number of years been engaged in studying these problems and has by this time completed a number of reports that tend to solve many of the difficulties met with in the burning of coal. These reports are not only of extremely great value to the engineers and firemen of power plants, but they are also a practical aid to the householder in keeping up his furnace in an economical manner. Many of the conclusions of the bureau, as embodied in these reports, can be put into operation at once with a great saving of coal and without any expensive new equipment being installed.

"Looked at in a broad way, it is not economical to transport high-grade coal through long distances into districts where fuels of lesser value are to be had in abundance, when as a matter of fact, the cheaper fuels could be satisfactorily used if the user would show a little patience and gumption. The suitability of fuels for use in any locality is, therefore, a matter of public education in which the bureau of mines takes a deep interest. As an illustration, the substitution of coke for anthracite coal in many localities is very desirable on the score of economy, and the bureau desires to stimulate the use of coke as a domestic fuel because of its cleanliness.

"And while discussing waste, allow me to say that the brilliant lighting of the roofs of apartment houses at night merely for the purpose of making a pretty picture in the sky ought to be stopped during the period of the war. It is the most glaring example of waste of precious resources that I have seen anywhere."

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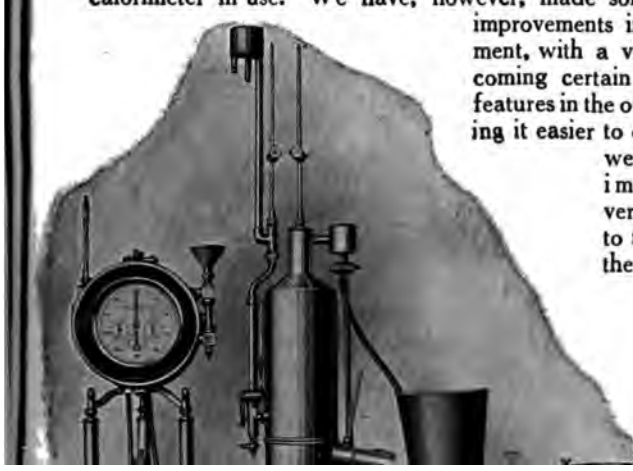
is of the same general design and operates on the same principle as the well known Junkers Calorimeter, which has heretofore been regarded by gas experts as the most satisfactory form of calorimeter in use. We have, however, made some valuable improvements in the instrument, with a view to overcoming certain troublesome features in the original, making it easier to operate, and we find these improvements very acceptable to the users of the calorimeter.



This Calorimeter, with its accessories, is constructed in accordance with the recommendations made by the Committee on Calorimeters of the American Gas Institute. It also has the approval of the Public Service Commission of the Second District, Albany, and has been found by them to give accurate results.

This Calorimeter is now furnished with baffle plates for burner, in accordance with the latest recommendations made by the Committee on Gas Calorimetry of the American Gas Institute and of the Bureau of Standards, Washington.

This Calorimeter is also now made so that it can be taken apart, making all parts accessible. Metal tubing is also used in making the connections.

Complete Details and Prices on Application

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Those who read ads profit as well as those who insert them.

Operating Under Difficulties

Gas Companies of Denmark Resort to Rare Expediencies to Keep Their Service Going—Coal and Petroleum Scarce—Hay Cookers Are Popular

The struggle that has been going on in Copenhagen to overcome the lack of coal is graphically described by J. O. V. Irminger in the London Gas Journal. We commenced some year or more ago, says Mr. Irminger, to mix gas coals with steam coals—the latter being the more abundant. At first, we used a smaller quantity of steam coals; but later on about half-and-half. The worst thing with the steam coals was the bad coke; and also in this condition they were variable. Experiments in our small test plant informed us as to the value of the steam coals—testing the amount of gas, the calorific power, and the consistency of the coke. The first two of these proofs gave, of course, a result lower than from gas coals, but generally tolerably good; but the coke was nearly always so bad (often like powder) that it could not be used under the retorts. Then the steam coals were mixed with the gas coals in such proportion that we could burn the coke and also sell it, in spite of its somewhat inferior quality.

Low Candle Power Gas Used.

This was not sufficient, and for a long time we have used 20 to 30 per cent. of carburetted water gas, at first with ordinary carburation, but later only half of it. At last we stopped-off the oil; our stocks of oil being very small, and with no prospect of having more of it. We used at first only 20 to 30 per cent. of blue water gas; but, finally, for the last few months, 50 per cent of blue water gas was mixed before the condensers with the coal gas made from half steam coals and half gas coals. Besides this, we use 2 per cent. of air for the oxide purifiers. The calorific power of the gas —measured daily—is approximately 4000 calories per cubic metre (gross). The illuminating power is, of course, very low; but nobody takes notice of this. It was necessary to advise all the consumers to, more or less, close the air-holes of their cooking apparatus; and this was done by distributing printed information. Generally the air-holes were closed by a strip of paper with some small holes pierced in it; and the gas burned well. Also the incandescent burners were adjusted by closing the air-holes; and they are acting quite as well as with ordinary coal gas—usually better. The flat-flame burners are all done away with.

Consumption Not Reduced.

The corporation tried in March this year to diminish the consumption of gas by allowing only a fixed and moderate amount of gas, in proportion to the number of members in a family; and when the consumption is 25 per cent. more, the price of the extra gas is three times higher than ordinary (which is about 3 cents per cubic metre), going up to eight times the ordinary price for any gas consumption higher than this. In spite of this high price, the consumption was not reduced very much. At the beginning, the reduction compared with the year before was about 30 per cent.; but more and more the consumption is going up again, and the reduction is now only 15 to 20 per cent. less. One reason is, perhaps, that there is very little petroleum in the city, and so people are obliged to use gas alone, when they need to prepare their food. In these hard times, people are not unreasonable, and comparatively few complaints are heard—indeed, not more than usual.

I may mention that in most households "hay cookers" are used. They are boxes (17 in. × 17 in. × 15 in. high), of ½ in. thick wood, lined inside (bottom and sides) 3 to 4 in. thick with hay or crumpled newspaper. The pot (with cover) containing the meat to be boiled is kept heated to the boiling point in a quarter to half an hour on the gas-stove. Then (with the cover on) it is quickly placed in the box, and covered carefully with a cushion filled with cotton or similar isolating stuff. The cushion must be somewhat larger than the pot. The box is then closed tight with a wooden cover. In this manner the meat will remain at nearly the boiling point for several hours; and it will remain hot six to eight hours, thus saving much gas. It is ascertained that the meat is better boiled in this box than usually over an open fire; and the meat is never burned. I do not know if this is used in England; otherwise it is much to be recommended.

Had Fewer Accidents.

Our gas at present contains about 22 to 25 per cent. of carbon monoxide, and is, of course, more poisonous than ordinary coal gas. It was deemed necessary to warn the consumers to keep their gas-pipes tight, and close the stop-cocks of their meters when they observed the slightest smell of gas. There have been some few accidents; but in all cases there has been some great neglect with very leaky pipes, open burners not lighted, etc. Some medical men proposed to put "perfume" in the gas to warn consumers. Several things were tried in our laboratory, but none with any good results. The best thing was to mix the uncarburetted water gas with coal gas; and we found by experiments that only 20 per cent of coal gas was more than sufficient to give a smell of practically the same strength as pure coal gas, which has also the great advantage that the smell is known to everybody. This is our experience; and we only wish we were in a position to make more blue water gas, but our plants are working at full power.

Calorific Standard a Safeguard in War; An Asset in Peace.

During the coal strike of 1912, says the British "Municipal Journal," the authorities were compelled, owing to the limited supply of coal, to give a free hand in the matter of gas manufacture in order to obtain the maximum amount of gas from the coal. The result was that in one large district alone the nominal illuminating power of the gas was reduced sufficiently to enable the gas undertakings to save 65,000 tons of coal in two months, and the public never noticed the difference, because the heating power was practically unaffected. Such a saving was only rendered possible by the suspension of the old method of testing gas for illuminating power. That suspension was but temporary; but the lesson was not lost upon the government. Nor should it be lost upon the public, all enlightened members of which must realize that the new Standard of Calorific Power Act is not only a national safeguard in time of war, but a financial asset in time of peace. Finally, the "Municipal Journal" says of modern "stripped gas" that if used with an incandescent mantle it gives, if anything, a rather higher illumination per cubic foot than before, owing to the greater intensity of flame which it produces.

Fate of Mahanoy City Gas Plant Still in Doubt.

Manager J. V. Cattron, of the Mahanoy City (Pa.) Gas Co., received official notice from H. S. Schutt, Philadelphia, manager of the C. H. Geist syndicate, directing him not to close the Mahanoy City plant, as was anticipated, but to continue operating the same until August 1, pending negotiations by way of sale, lease or other disposition.

Standards for War Conditions

Results of Investigation Recently Conducted at Northampton, England, Which Bear Upon Heat and Candle Powers and Essential By-Products

The British Board of Trade recently issued a draft order under the Calorific Standard Act, and invited the observations of the Northamptom Town Council thereon.

Northampton reports that considerable efforts have been made, in conjunction with the Swansea and other corporations, to induce the Board of Trade to insert conditions in any order safeguarding the interests of the consumer on these points: (a) By a standard not lower than 550 B. t. u. (b) Against any increased cost to the consumer. (c) Provision of incandescent burners at the cost of the company. (d) By increasing present pressures. (e) Establishment of a testing station. (f) Limitation of the order to the period of the war, or a short reasonable time afterwards.

In regard to (a), (b), (c) and (f), the appeals to the board have been unsuccessful, the standard being fixed at 500 B. t. u. So far as Northampton is concerned, free provision of incandescent fittings is not imposed upon the company, nor, it is understood, upon the other companies concerned. Penalties are imposed for deficiencies in calorific power. The company is called upon to provide, at the prescribed testing place, such apparatus as shall be agreed upon between the company and the corporation, failing which the apparatus will be that prescribed by the Metropolitan Gas Referees. The pressure is increased to 15-10ths. It is provided that the company, when required, within two years after the date of the order, at the request of any consumer, shall supply and fix flat-flame burners, suitable in all respects for the gas, in substitution for any burners (not being incandescent burners) in use by the consumer before the date of the order. Provision is made that, after the expiration of five years from the date of the order, application may be made to the board to reduce or increase the standard or pressure. The evidence established the following:

(a) That the substitution of a calorific standard of 500 B. t. u. for the present illuminating standard of 15 c.p., would give a much lower illuminating power when burnt with a flat-flame burner; and that a considerable increase in the quantity of gas consumed would be necessitated by the alteration of the standard.

(b) That the proposed standard makes no allowance for the presence of inert constituents in the gas supplied.

(c) That the illuminating power of a luminous gas rises and falls with the calorific power.

(d) That gas of 500 B. t. u. is not suitable for illumination when burnt in a flat-flame burner. An incandescent burner is required to give proper illumination.

(e) As the calorific value is reduced by the extraction of benzol and tuluol, more gas has to be used to serve the same purpose, whether for lighting or heating, under higher pressure, because a greater quantity of gas has to be forced through the same pipes, or an increase in the area of the pipes would be necessary.

(f) That the adoption of a calorific standard of 500 B. t. u. will enable considerable economies to be effected in the supply of gas to the consumers; and there is no surety that the consumer will obtain the benefit of such economy of manufacture by a corresponding reduction of price.

(g) It is clear that consumers will have to bear the cost of any necessary alteration to their present burners; and the evidence shows that the alteration of the standard will entail a considerable increase in the consumption of gas.

Color Temperature of Illuminating Gas Flames.

It is of considerable importance in the photometry of gas flames to know their color temperature, because it determines the efficiency at which incandescent electric lamps must run to match them in color, says E. F. Kingsbury of the United Gas Improvement Co., in the June issue of the Journal of the Franklin Institute.

While the color temperature of the ordinary illuminating gas flames has been known approximately for a long time, recently the question of its variability with the quality of gas and the flame size arose; so the following data may be of interest. Each flame was matched against a carbon lamp whose efficiency was accurately known at several voltages. Using the data on color temperature given by Hyde and Forsythe in the March Institute Journal, these matching voltages have been evaluated in terms of temperatures:

Color Temperatures of Various Gas Flames.

Source	Lamp voltage (E.T.L. No. 4621)	Color temperature °K.
1. Coal gas full flame	111.0	2075
2. Coal gas, half turned down	107.5	2035
3. Water gas, full flame	115.4	2118
4. Water gas, half turned down	105.5	2015
5. Water gas, full flame, edge on	111.5	2080
6. Mixed gas, full flame	113.5	2095
7. Coal gas, full flame	113.8	2100
8. Coal gas, candle-shaped flame, height of Hefner	97.0	1940
(Reference points)		
9. Pentane lamp	93.5	1914
10. 4.85 w.p.m.s.c.p. carbon	110.4	2070
11. 3.73 w.p.m.s.c.p. carbon	118.8	2153
12. Hefner	88.0	1875

Nos. 1 to 6 inclusive were using an 8-ft. Von Schwarz excavated head lava tip; No. 7 was with an 8-ft. Bray union jet tip, and No. 8 was with a ⅛-inch open tube; Nos. 9 to 12 were taken as references from the paper referred to. The coal gas was eight to nine candle-power and 575 B.t.u.; the water gas 27.5 candle-power and 690 B.t.u., and the mixed gas, 25 candle-power and 665 B.t.u.

As is to be expected, the color temperature of a flame is within certain limits dependent upon its shape, size, position, and composition of the gas. It will also vary in different parts of the flame, the values given above being integral over the entire surface. It will be noted the full flames are slightly whiter than the ordinary 4 w.p.h.c.p. carbon standards. The color temperature of 1870° for the mixed gas flame given by Hyde and Forsythe in the paper referred to is considerably lower than any of the above values, which represent extremes in illuminating gas characteristics.

Bemis to Conduct a Gas Investigation for City of Pittsburgh.

E. W. Bemis, who recently conducted the city's case in the Chicago gas rate investigation, and W. E. Reed, of Pittsburgh, have been retained by the city of Pittsburgh to conduct a similar investigation there.

New Booklet on Public Utilities by W. S. Barstow & Co.

W. S. Barstow & Co., 50 Pine St., New York, has published a book of 71 pages on public service properties having annual gross earnings in excess of $7,000,000. The affairs of about 60 companies are dealt with, by way of financial statements and an outline of the localities they serve, and the kind of service rendered, whether electric, gas or other utilities. A map accompanies the data on each company, indicating the extent of its transmission or distributing lines.

CONSTRUCTION NEWS

Plan to Light and Heat Tacoma Cantonment With Gas.

Negotiations are under way between the Tacoma (Wash.) Gas Co. and the United States government for the installation of a gas heating and lighting system at the American Lake cantonment camp. Elmer Dover, president of the gas company, put the proposition up to the heads of the camp, who recommended it to Washington. An expenditure of $200,000 is involved. The company's high pressure main running to Olympia passes within a mile of the camp site and is capable of furnishing enough gas for the camp's needs, Mr. Dover says. The greatest cost would come in the erection of a holder.

To Enlarge and Improve Junction City (Kans.) Plant.

The owners of the Junction City (Kan.) gas plant recently visited that city and completed plans for a number of improvements. The capacity will be almost doubled and every department enlarged.

Girardville Gas Co. Erecting Holder at Lansford, Pa.

The Girardville Gas Co. is erecting at Lansford, Pa., a new holder with a capacity of 100,000 cu. ft. This will accommodate increased consumption of gas in the Panther Valley.

Duluth, Minn., Orders $9,000 of New Mains.

Contracts for the extension of gas and water mains to cost $9,000 have been authorized by the city council of Duluth, Minn.

New Water Gas Set Going in at Peterborough, Can.

The Economical Gas Apparatus Construction Co., of Toronto, is installing a five-foot set of carburetted water gas apparatus at the Peterborough (Ont.) gas works for the Hydro-Electric Power Commission.

Grand Rapids Gas Light Co. To Move Aug. 1.

The Grand Rapids Gas Light Co. will occupy its new building about August 1. The building is 80 feet front, extending back 90 feet, three stories and basement, fireproof construction. The first floor will be occupied by the business offices and showrooms, the second by the clerical staff and parlors for the women employes. The executive offices will be on the third floor and the shops in the basement.

The company has been located in its old offices for a quarter of a century.

Duty To Extend Mains.

A gas company is not bound to extend its mains to territory not occupied by it, unless required to do so by statute, ordinance, charter, or contract, although it may have the privilege to occupy all streets, and even under statute it is not required to extend mains unless the property is within a "reasonable distance" or there exists a reasonable expectation that the consumption of gas will warrant the necessary expense. Petition, alleging that real estate promoters needed extension of gas mains to develop their property and to meet the growing demands of the city, etc., held insufficient to show a reasonably sufficient demand for gas to make it the company's duty to extend mains.—Zeilda Forsee Investment Co. vs. St. Joseph Gas Co., Kansas City Court of Appeals, Missouri, 195 Southwestern 52.

Only three gas meters of the many thousands in use in Sioux City (Iowa), were found out of order by the city inspectors last month, which is considered to be an unusual record.

Imperial Belting Co. Adds Two Men.

Harry E. Dennie, for many years connected with the rubber industries, has been appointed general manager of the Imperial Belting Co. Mr. Dennie was previously located in Chicago, where he has many friends who will be pleased to learn of his success. Prior to coming to Chicago and for some time back, Mr. Dennie has operated on the Pacific coast as manager of the company's interests west of Denver. In transferring his headquarters, he returns to his original field of operation and old friends.

W. S. Bloomer, who has for the past 24 years been connected with one of the largest rubber manufacturers, was also originally a Chicago product, and previously located in Seattle, Wash., as Pacific Northwest manager of this rubber company during the past 6 years, more recently made special representative throughout the Western States, has been appointed general sales manager of the Imperial Belting Co. with headquarters at the parent office in Chicago.

LEGAL DECISIONS

Gas and Oil Lease.—Drilling Operations.

An oil and gas lease of lands within a district not yet developed, where there was little likelihood of the oil being drained through wells on adjoining lands, for a term of one year, and so much longer as oil and gas were produced in paying quantities, which required the lessee to commence operations within 45 days, and to drill to a depth of 2,800 feet unless oil or gas was found in paying quantities at a less depth, is not so inequitable against the lessor as to deprive lessee of his right to injunction to restrain removal of oil and gas by a subsequent lessee, nor does an extension for six months of the time within which to commence operations render it inequitable.—Downey v. Gooch, U. S. District Court, Oklahoma, 240 Federal, 527.

Gas and Oil Lease.—Basis for Rental.

In an action for rental under an oil and gas lease providing that "such well or wells shall be gauged in the casing in which completed every six months," and which stipulated a rental based upon the pressure of gas in the well, held, on the evidence, that it was for the jury to say whether the well was completed in the 3-inch casing, as contended by plaintiff, or in a 6⅝-inch casing, as claimed by defendant.—Addleman v. Manufacturers' Light & Heat Co., Supreme Court of Pennsylvania, 100 Atlantic, 444.

Natural Gas Lease Held Not Void by Court.

A city entered into a lease with plaintiff, by which it acquired the gas rights to a tract of land and agreed to pay therefor an annual rental of $200. The lease provided that it should remain in force for the same length of time as another lease covering gas rights to an adjoining tract upon which the city was then operating gas wells. Held, the lease is not void on the ground that its duration is indefinite and uncertain. After making the annual payments of rental for seven years, the city, while still operating gas wells on the adjoining lands under the other lease, attempted to cancel its lease with plaintiff by executing and recording a release thereof and refusing to make further payment of rentals. Held, the attempted cancellation was of no effect, and so long as the lease remains in force the city cannot avoid its liability thereunder on the ground that the rights obtained are of no value.—Butler v. City of Iola, Supreme Court of Kansas, 163 Pacific, 652.

ABOUT MEN YOU KNOW

Gravely Doing Good Work for Long Island Gas Corp'n.

The Long Island Gas Corp'n, R. C. Graveley, of Sag Harbor, N. Y., manager, recently completed a high pressure line about eleven miles long from Sag Harbor to Southampton, the Newport of Long Island, and expects to be supplying gas to that town within the next three weeks.

John H. O'Brien, formerly superintendent of the New York & Queens Gas Co., Flushing, N. Y., died June 24, aged 47.

Henry G. Matthews, general manager of the Quebec (Can.) Railway, Light, Heat & Power Co., died recently from an operation. He was born in Montreal, July 1, 1878.

Einosuke Okawasa, manager, and Nawoshige Osawa, gas-engineer for the Tokyo (Japan) Gas Co., are making a tour of the gas plants of the United States.

W. K. Eavenson, sales manager for the Surface Combustion Co., Long Island City, N. Y., has resigned to take a position with Long-Landreth-Schneider Co., New Brunswick, N. J., who make the Kompak water heater. Mr. Eavenson formerly was with the New York Consolidated Gas Co.'s Industrial Fuel department.

Donald L. Mitchell, formerly with the Estate Stove Co., in Central Western territory, now is on the commercial staff of the St. Clair County Gas & Electric Co. at East St. Louis, Ill.

W. B. Miser, formerly with the Illinois Traction System at Jacksonville, Ill., has been appointed manager of the Drumright (Okla.) Light & Power Co., one of the new properties recently acquired by H. M. Byllesby & Co., and which will be part of the enlarged Oklahoma Gas & Electric Co.

The Bridgeton (N. J.) Gas Light Co. has elected the following directors: B. H. Minch, Samuel P. Fithian, William C. Mulford, Edward P. Bacon and H. A. Jorden. The directors have elected Mr. Minch president, Mr. Fithian vice-president, Mr. Mulford secretary and B. F. Harding treasurer of the company.

A naval scout training camp, named "Camp Doherty" after Henry L. Doherty, has been established by the government at Lake Contrary, near St. Joseph, Mo.

General Harries Resumes His Military Service.

Gen. George H. Harries, for years prominent as a public utility executive, has received a leave of absence from the various corporations with which he is connected in order to resume military service. He is now in command of the Nebraska National Guard, at Fort Crook, having been commissioned brigadier general by Governor Neville, as of June 25, and will be recommended by the War Department for similar rank in the regular army. Governor Neville, in selecting General Harries to lead the three Nebraska regiments expressed the hope that when they become a part of the regular army, August 5, by application of the draft, General Harries would continue to command the brigade. The Nebraska troops will be trained and brought to war strength at Deming, New Mexico. General Harries since 1912 has been a vice president of H. M. Byllesby & Company. He is also president of the Louisville Gas & Electric Company, the Omaha Electric Light & Power Company, the Arkansas Valley Railway Light & Power Co., and an officer in a number of other large utility organizations. From 1900 to 1911 he was vice president and general manager of the Washington (D. C.) Traction and Electric Co. During the past two years he spent much of his time in Omaha and became associated with many civic and patriotic activities in Nebraska.

Gen. Geo. H. Harries.

"BUD" KNIGHT'S DEATH.

Popular Member of General Gas Light Co. Killed in Auto Accident.

Allen Potter Knight, known to every gas man in the country as "Bud" Knight, was killed July 9, in an automobile accident in Kalamazoo, Mich., his home town. He was the son of J. J. Knight, of the General Gas Light Co., and was assistant sales manager of the company at the time of his death.

The news of Mr. Knight's death has caused widespread regret throughout the Middle West, in which section of the country he was perhaps best known because he was more closely associated with the gas fraternity here than elsewhere. Over the entire industry, however, the news will carry with it a feeling of deep and sincere sorrow, for everyone who knew him regarded him as a personal friend. He had that rare quality of kindliness that at once impressed itself on those with whom he came in contact and this, with his genial personality, had made him a circle of warm friends limited only by the extent of the industry in which he was engaged. In the intimate circle of his friends he was genuinely loved as a man who constantly maintained all the manly qualities of mind and character, and was never known to be out of humor with anybody or anything. The death of such a man is a distinct loss, and in this instance it will be keenly felt by the gas fraternity in this country.

Mr. Knight, who was born in Kalamazoo, August 24, 1888; was a descendant of one of that city's oldest and most prominent pioneer families. His maternal grandfather, the late Allen Potter, was closely identified with the industrial growth of the community to which he came as a young man. Allen Potter was Kalamazoo's first mayor and for one session represented the district in congress.

L. E. Myers, president of the Michigan Gas & Electric Co. of Ishpeming, has been signally honored by being appointed as an assistant to Herbert C. Hoover in the supervision of government food control. Mr. Myers and Mr. Hoover have been friends for many years.

GAS LITERATURE AT A GLANCE

Conducted by R. S. McBride and C. E. Reinicker, Bureau of Standards, Washington, D. C.

Hints As to the Prevention of Naphthalene Stoppages.

By a committee of the Institution of Gas Engineers. "Gas World," 66, 224-225 (March 17).—It is pointed out that the quantity of naphthalene remaining in the gas depends to a very large extent upon efficient condensing, and that frequently the trouble is due to insufficient cooling capacity in the plant. A further reduction of naphthalene may be accomplished by washing the gas with absorbent oils. Suitable oils are green oil mixed with 3 to 5 per cent. benzene, paraffin oil, light coal tar oils, and water gas tar. The oil used should not contain more than about 5 per cent. of naphthalene. Another method of avoiding naphthalene troubles is to put solvent vapors into the gas; these should preferably be vapors of oils of higher boiling points. Oils derived from coal tar and water gas tar are best if obtainable. Paraffin oil may be used, but to be effective must be introduced as a fine mist. Usually the addition of 10 to 15 gallons per million cubic feet is sufficient. It should be introduced at the storage holder inlet or into the main leaving the works.—D.

Estimation of Benzol and Toluol in Gas.

By Harold E. Copp. "Gas World," 66, 222 (March 17).—A simplified apparatus for the quantitative absorption of benzol and toluol in wash oil is described. The writer passes the measured gas through a calcium chloride tower filled with glass beads which are kept moist with wash oil dripping upon them. The wash oil flows from the bottom of the tower through a seal into a collecting bottle and is then fractionated to determine benzol, toluol, etc. The advantages claimed for this apparatus are: (1) complete absorption of the benzol and toluol in the oil on account of the very thorough contact, and (2) the small back pressure to which the gas is subjected.—D.

Boiler Feed Water on By-Product Coking Plants.

By W. Diamond. "Gas World," 66, Coking and By-Products Section, 17-18 (March 3).—The writer enumerates the chief mineral impurities which have a detrimental effect in steam boilers and shows how they may cause danger and inefficient operation. He classes the hardness of waters as (1) temporary and (2) permanent, and states that the examination of boiler feed water should include the determination of (1) free CO_2; (2) alkalinity; (3) lime; (4) magnesia. He outlines analytical methods for these determinations. He then discusses water softening and enumerates the three points which he considers vital in the process as (1) temperature of the water to be treated; (2) rate of flow of water during treatment; (3) sufficient area of the filtering materials to clarify the water of any precipitate. Finally he discusses the recovery of exhaust steam and the return of the condensate to the boiler. He mentions the detrimental effects of oil in the condensed steam and suggests means of freeing the water from oil. —D.

Occurrences in the Oven During Carbonization.

By D. V. Hollingworth. "Gas World," 66, Coking and By-Products Section, 12-15 (March 3).—The writer gives a representative elementary analysis of gas coal and shows the wide variations of composition even in coals from different parts of the same seam. He reviews the work of other investigators in attempting to determine the composition of coal. He then enumerates the factors which influence the quality and composition of the products of coal distillation and suggests how their influences may be controlled or compensated for by careful operation.—D.

The Fixation of Ammonia in Soils.

By R. C. Cook. "Soil Science" via "Gas World," 66, 177 (March 3).—The writer describes a study of the fixation of ammonia in five soils—a sand, a sandy loam, a loam, a silt loam, and a clay soil. The absorptive capacity for NH_3 was smallest in the sandy soil and greatest in sandy loam. It ranged from 266 pounds of $(NH_4)_2SO_4$ per acre (6-inch layer) in the sand to 2,642 pounds in the sandy loam. The presence of CaO seems to exert more influence than other factors. The absorption of ammonia follows the percentage of combined iron, aluminum, lime, carbon dioxide, as well as the organic matter and physical properties of the soil. The presence of potassium or phosphate reduces the absorptive capacity of the soil. In light soils the ammonia distributes itself in the deep layers, while in heavy soils it is held in the first three or four inches below the surface.

Metal Melting by Gas.

A series of four papers by W. H. Hocking, G. B. Brook, C. M. Walter and H. M. Thornton. "Gas Journal," 137, 598-603 (March 27).—These papers deal with the various aspects of melting metals by gas and describe the latest English methods of metal melting. The desiderata in metal melting were: First, speed; second, purity of the molten metal, which must be preserved from gaseous contaminations and at the same time be kept at controlled temperature; third, economy in fuel; fourth, economy of labor; fifth, economy of repairs. All the papers were discussed.—D.

Tar.

By Regnald Cross. "Gas Journal," 137, 561-565 (March 20).—The writer gives a brief sketch of the history of tar production and tells of the various restrictions placed upon the handling, working up, and sale of tar and its distillates. He tells of the many by-products obtainable from tar and mentions the influence of temperatures, quality of coals, etc., upon the composition and quantity of the tars produced. He then gives in considerable detail, data as to the composition and properties of tars produced in the different types of coal-gas installations, and outlines the process of tar distillation and discusses the industrial applications, prices, and prospects for tar and its products.—D.

Zirconia As a Refractory Material.

By J. A. Audley. "Gas Journal," 137, 559 (March 20).—Zirconia is widely distributed in small quantities, chiefly in the mineral zircon. It is found in considerable abundance in southern Brazil. It is also obtained as a by-product from monazite sands from which cerium and thorium for gas mantles are obtained. The melting point of zirconia is nearly 2,000° C for the raw material and higher for the purified. It is insoluble in acids, except hydrofluoric, and resists both acid and basic slags as well as cyanides and alkalies. Only melting bisulphates and fluorides attack it. The expense of zirconia bricks is said to be compensated for by their special qualities. Red hot bricks can be plunged into water without cracking or breaking. They have been used for hearth linings of steel furnaces with good results. Mixtures of zirconia with clay or carborundum for special purposes have been recommended.—D.

Relation of Calorific Power of Gas to Fuel Economy.

Editorial Notes. "Gas Journal," 137, 550-551 (March 20).—The editor expresses the opinion that the gas industry cannot be as useful to the nation when supplying uselessly high calorific value gas as would be the case with a lower quality. He thinks that levels lower than 500 B.t.u. will be justifiable if, under normal conditions, it would be possible to supply more heat for a given price and if the gas is low in inert components. This, he states, can be accomplished by using the surplus coke in peace times to make blue water gas with which to dilute coal gas. It is claimed that any distribution difficulties in supplying such low quality gas could be overcome by increasing pressure, but that the aid of the appliance manufacturers would be necessary by providing all gas-burning appliances with air adjustments.—D.

MacLaurin's Low-Temperature Carbonization Process.

By Robert MacLaurin. "Gas Journal," 137, 517 (March 13).—The author describes an experimental plant which consists of an elongated producer about 30 feet high, in which means are provided for trapping the oil condensing in the cold fuel and preventing it trickling down into the hotter regions. This also prevents the coke from "binding up" in the upper part of the producer. Power gas, oil, and ammonia are obtained when burning the coal to ash. The attempts to make illuminating gas by this process have failed, the product being poor and insufficient.

RECENT PATENTS

By R. S. McBride, U. S. Bureau of Standards

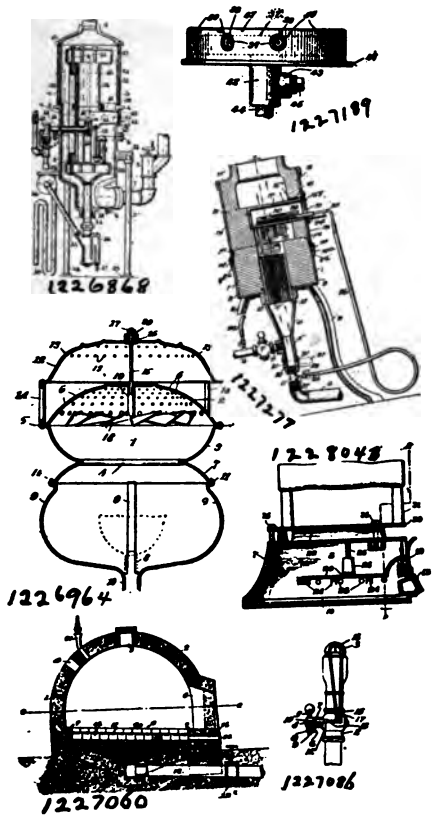
Patents Granted May 22, 1917.

1,226,690. PIPE-FITTING. Manning L. Nix, Oklahoma, Okla. A tubular body with slitted ends serves to grip the lead connection such as for meters. (p. 1012.)

1,226,868.* HEATER. Harry S. Dodd, Toronto, Ontario, Canada. (p. 1073.)

1,226,964.* GAS HEATER. William C. Fischer, New York, N. Y., assignor to The Compound Heater Mfg. Co., Inc., a corporation of New York. The heater comprises a perforated heat radiating chamber with a fan which rotates in it under the draft of heated air so that this heated air passes out through the perforations of the two upper dome sections. (p. 1106.)

1,227,060.* COKING OVEN. Matthew Marshall, Sr., Vancouver, British Columbia, Canada. The sub-floor drains to a pipe to convey off condensed material formed on the cool walls; the floor is of fire brick specially laid up to give the desired structure in relation to the natural lines of condensation flow. (p. 1139.)



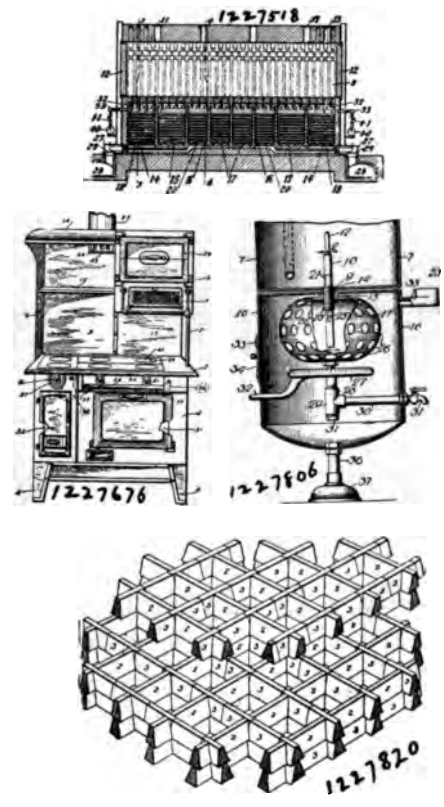
1,227,078. VALVE. Arnold O. Rutz, Milwaukee, Wis. The valve of the Rutz lighter for ranges. (p. 1146.)

1,227,086.* GAS BURNER. Jesse G. Steenson, Minneapolis, Minn. A thermostatically controlled spring device to shut off the gas if the heated part becomes cold, e. g., if the flame is blown out or goes out for any reason. (p. 1149.)

1,227,087. UNDERGROUND PIPE-COVERING SYSTEM. Walter L. Steffens, Cincinnati, Ohio, assignor to The Philip Carey Manufacturing Co., Lockland, Ohio, a corporation of Ohio. The insulating covering has a shield "in the form of resilient cylindrical shells, each longitudinally separated on one side and sprung over said insulating covering and suitably secured together there around." (p. 1149.)

Patents on subjects of interest in the gas industry were granted on the dates indicated. The page in the Official Gazette of the United States Patent Office of these dates is shown in parenthesis for each patent. Numbers marked thus (*) are illustrated. Printed copies of patents are furnished at 5 cents each by Commissioner of Patents, Washington, D. C.

1,227,189.* GAS BURNER. Lewis F. Ostrander, St. Louis, Mo., assignor of one-half to J. F. Esperon, Indianapolis, Ind. A hood covers the burner proper and the gas jets issue through holes in its sides. (p. 1183.)



1.227,259. PRODUCTION OF SELF-LIGHTING GAS MANTLES. John G. Gotty, Jacksonville, Fla., assignor to the Gotty Gas Lighting Co., a corporation of Florida. The composition is platinum black, metallic platinum in particles and a dissolvent comprising alcohol, glycerine, and dextrose. (p. 1207.)

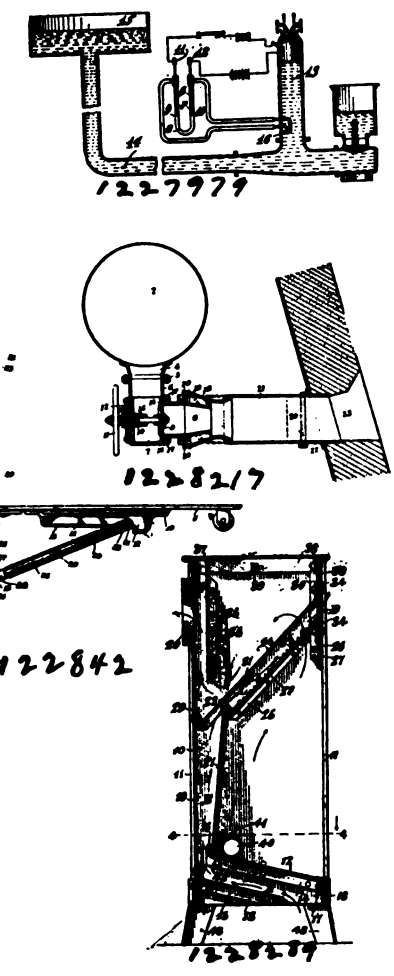
1,227,260. GAS MANTLE RING. John G. Gotty, Jacksonville, Fla., assignor to Gotty Gas Lighting Co., a corporation of Florida. (p. 1207.)

1,227,277.* BURNER FOR DENTAL FURNACES. Charles H. Land, Detroit, Mich. (p. 1212.)

1,227,518.* COKE OVEN. Elmer J. Crossen, Joliet, Ill. It comprises "a long narrow coke oven, a regenerator heater of substantially the same length as and located directly beneath the oven, a row of combustion chambers vertically arranged along the two longitudinal side walls of the oven, ports extending laterally in both directions from the upper part of the regenerator into the lower ends of the combustion chambers, means for periodically supplying gaseous fuel to all of the combustion chambers at both sides of the oven and means for controlling supply of air to and through the regenerator to all of the combustion chambers.

Patents Granted May 29, 1917.

1,227,676.* STOVE. Henry H. Sanford, Mansfield, Ohio, assignor to New Method Stove Co., Mansfield, Ohio, a partnership composed of Henry H. Sanford, Bernhard R. Ahrendt, Edwin D. Baxter and Berry A. Baxter. A combined gas and solid-fuel range. (p. 1373.).



1,227,806.* WATER HEATING APPARATUS. Samuel Leavitt, Chicago, Ill. (p. 1418.)

1,227,820.* REGENERATIVE STOVE. Alfred C. Nelson, Lakewood, Ohio. The flue structure has vertical non-interconnecting flues with wall surfaces of the flues having projecting ledges or irregular shoulders facing downward around the entire wall to give good contact with the gases passing. (p. 1423.)

1,227,829. APPARATUS FOR AND PROCESS OF BURNING GAS. George L. Reichhelm, New Haven, Conn. A process of combustion consisting in first supplying a com-

bustible gaseous mixture, then dividing the same into a plurality of streams, retarding the velocity of the streams below the rate of flame propogation by directing them toward each other from opposite directions and then igniting such mixture at the point of retardation. (p. 1426.)

1,227,879. AUTOMATIC GAS CONTROLLER. Sydney George Gardiner Brookman, Bristol, England. A thermostatic valve to cut down the gas flow to steam boilers of small size when the steam is produced; shown as applied to a coffee urn. (p. 1443.)

1,227,881. SAFETY MEANS FOR AUTOGENOUS WELDING OR CUTTING APPARATUS. Rudolph E. Bruckner, New York, N. Y. The pressure in the flexible tubes to the torch is so cut down or regulated that at the point of mixture neither gas will flow into the other container. (p. 1444).

1,227,979.* IGNITION CONTROL. Charles C. Trump, Syracuse, N. Y., assignor to Humphrey Gas Pump Co., a corporation of New York. The method uses the pressure of liquid to effect a medium against a restoring force and permits this force to act when the pressure changes. (p. 1478.)

1,228,042.* OVEN DOOR. Henry W. O'Dowd, Jersey City, N. J., assignor to William M. Crane Co., a corporation of New York. (p. 1499.)

1,228,043. SAD IRON. Henry W. O'Dowd, Jersey City, N. J., assignor to William M. Crane Co., a corporation of New York. (p. 1499.)

1,228,217.* GAS BURNER. Julian Kennedy, Pittsburgh, Pa. A furnace burner. (p. 1555.)

1 228,289.* GAS HEATER. Hamilton K. Boyd, Pittsburgh, Pa., assignor of one-half to Ernest H. Ohlendorf, Mims, Fla.

COMMERCIAL ECONOMY.

Council of Defense Board Asks the Aid of Every Business Man.

The Commercial Economy Board of the Council of National Defense wants the voluntary assistance of every business man. This board is endeavoring to save lost motion in business during the war and in this manner to release men and materials for the war. Whatever can be done in this respect will correspondingly reduce the demands upon important business operations. In practically every trade there have grown up non-essential services, some of them mere conveniences and others hardly that. In time of peace they may be permissible. In time of war they are a serious waste, and should be stopped.

Retail Delivery.

The board is now studying the retail delivery system. Suggestions will soon be made to avoid duplication of delivery service, and to reduce the number of deliveries made, and an effort will be made to bring home to store patrons that going home empty-handed keeps men from essential employment and that a package under the arm is not in these times a thing to be ashamed of, but rather a mark of patriotism.

Number of Styles.

One of the costliest of the non-essential services so far considered by the board is the offering by commercial concerns of an excess variety of styles. In some lines of business, the board has been informed by men in the business, the styles could be reduced 25 to 50 per cent. without inconvenience to the customer. A conference was held on June 1 with the garment trades and later with the shoe trade. Joint committees in the trades are now at work reducing and simplifying the styles for 1918.

Gradual Readjustment.

Business men will understand the enormous savings which will be brought about by this work. Furthermore, they will appreciate the wisdom of this deliberate preparation for the future in contrast with hasty action which might leave unsold many styles already made up. The readjustments suggested have been made in the other countries at war and sometimes they have been made suddenly and drastically without opportunity to avoid loss.

The illustrations given above indicate in general what the Board of Commercial Economy is doing, which in short may be said to be determining the activities of commodity distribution which are unessential, and co-operating with business men to avoid this waste in time of war. In this work the board wants the co-operation of every business man.

Savings in Other Businesses.

In many lines of business similar savings may be made. In time of war business cannot continue to render the elaborate service possible in time of peace. In order that national energy may be directed first toward prosecuting the war, business activities must be reduced in many directions. If this is to be done gradually, and with due regard to supplies of materials and finished product already on hand, business men must act at once.

No time is to be lost. In every line of business men must consider what activities or services may be dispensed with during the war. The Board of Commercial Economy wants suggestions. Associations of business men should immediately appoint committees, if they have not already done so, to consider and act along the lines suggested. Much loss may be avoided by prompt, intelligent action.

The Board of Commercial Economy is in the Munsey building, Washington, D. C.

G. W. Boteler, the new manager of the Waukesha (Wis.) Gas and Electric Co., who assumed the responsibilities of that position on the first of July, is rapidly gathering up the threads necessary to the direction of the somewhat complicated duties of the business.

Don D. Wade, a nephew of Glenn R. Chamberlain, secretary of the Grand Rapids Gas Light Co., has been commissioned as a second lieutenant of infantry at the Presidio, San Francisco, following service in the camp for reserve officers.

Monroe, La., Gets Natural Gas As Fuel.

The temporary pipe line to furnish natural gas for the Monroe (La.) power plant was completed recently and the city has begun the use of gas for fuel.

THE MARKETS.

Benzol, Toluol, Naphthalin and Phenol—Present Prices on Pipe.

Large producers of benzol have established a minimum of 55c for nearby deliveries. At least four large makers of toluol are now under contract for their entire production of T. N. T. for the government and the price paid is based on toluol at $1.50. For those who have not their own by-product recovery plants the government has been buying toluol, but the attitude of the officials at Washington has changed, and it is stated that T. N. T. makers will hereafter have to supply their own toluol. Naphthalin is selling at 7 to 9 cents per pound; phenol, 50 to 55 cents per pound.

Heavy Demand for Pipe.

Inquiries run into thousands of tons of cast iron pipe for shipment to France, but it is not known when this business will be closed. Yonkers, N. Y., has placed an order with the Warren Foundry & Machine Co. for 118 tons of 4 and 6 inch pipe at $69.26, delivered, for the 4-inch, $66.26 for the 6-inch and $105 for the fittings; R. D. Wood & Co. bid $68.80, $65.50 and $112, respectively; J. P. Ryan, $70, $67 and $115; United States Cast Iron Pipe & Foundry Co., $70, $67 and $110. The City of New York has opened bids on 740 tons of 6, 8 and 12 inch. It is expected the requirements for the army cantonment sites at Yaphank, L. I., and Wrightstown, N. J., will not be heavy. It is estimated that approximately 700,000 feet of pipe will be required for national guard encampments throughout the country, but it is believed much of this will be filled with wood pipe.

Twelve-Month Deliveries on Steel.

It is becoming very difficult to have an order for plate or structural steel accepted for shipment in less than 11 to 12 months, and the question of delivery is more difficult in view of the heavy specifications now being distributed by the government.

PROBLEMS IN THE GAS BUSINESS

Conducted by W. M. Henderson, Assistant Engineer Gas Department, Pacific Gas & Electric Co., San Francisco.

ANSWERS TO QUESTIONS.

191—Circulating Holder Water.

We are finding our method of heating the water in the holder by a steam line with nozzles distributed at uniform distance around two-thirds of the circumference of the holder very expensive. Do you know of any method whereby hot water circulation may be used to better advantage?

Our attention has been directed to Question No. 191 on circulating holder water, and we beg to say: That we have, as indicated by Mr. H. H. Field, of Chicago, in the last few years perfected a method of heating holders by water. The saving as shown by this system is from 45 per cent. to 95 per cent. over the steam method. It is necessary to consider each installation separately, as conditions vary. If the inquirer will communicate with us we shall be glad to take it up with him or anyone interested. Perhaps it is a subject too large to discuss in detail here.

Geo. E. Crosby,
18 Mansfield street,
Boston, Mass.

215—Tar From Retorts.

Is there any difference in the yield of tar and such products from vertical retorts compared with the old horizontals?

Answer No. 1:

In answering this question it would first be necessary to understand that there are two types of vertical retorts, one a continuous type in which the coal is passing continuously through a retort, and the other the intermittent type in which the coal is charged at intervals, as in the coke oven or in the horizontals.

The methods of heating the retorts and the treatment of the gas are so different in these two methods that they cannot be considered as one system.

The experience of the writer has been mostly with intermittent vertical retorts, and he has data from actual working periods from which he can make comparisons.

The yield of tar from eastern coals in the intermittent vertical retorts is 14 to 15 gallons per net ton, and will average about 14.5 gallons per net ton. This is 2.5 gallons more than can be expected from horizontals using the same coal. The tar is of considerably more value than that made by horizontals and other types of coal carbonizing apparatus, because it contains from two to three times as much tar acids as that from other systems.

It is also low in free carbon, containing 5 per cent. against 25 to 35 per cent. in other systems. It can be expected generally that the tar from vertical retorts will contain about 30 per cent. more oils and these of greater value than those of other systems.

Gas works operating intermittent vertical retorts in general can obtain about 33 per cent. more per gallon for their tar than from the tar made in horizontals.

Continuous verticals also make a low carbon tar, but they do not contain as much tar acids as the intermittent vertical type.

This department will supply information on problems arising in every department of the gas industry. Your co-operation is solicited, both in asking and answering questions. Address: W. M. Henderson, Pacific Gas & Electric Co., 445 Sutter St., San Francisco, Calif.

NEW QUESTIONS.

223—Volume of Flue Gas.

What are the respective volumes of flue gases from the combustion of

1—Carburetted water gas, per cu. ft.?
2—Coal gas, per cu. ft.?
3—Anthracite coal, per lb.?
4—Bituminous coal, per lb.?
5—Charcoal, per lb.?
6—Coke, per lb.?

224—Compressed Air.

Can an ordinary steam engine be worked satisfactorily with compressed air in place of steam?

225 Solvent for Acetylene.

Has there ever been used commercially any other solvent for acetylene other than acetone?

REPEAT QUESTIONS.

219—Artificial Gas for Autos.
220—By-Products.
221—Interior Lighting.
222—Pulleys and Belts.

Intermittent verticals yield from two to three pounds more ammonia than the horizontals using the same coal. Continuous verticals make about 1 gallon more than horizontals. The total in yield from both types of verticals is more than that of horizontals.

The quantity of breeze made in the intermittent verticals is about that of the horizontals and the continuous about the same.

Both types make good coke, the intermittent coke being dense and hard and being similar in strength and weight to that made with similar coals by by-product coke ovens. Continuous vertical coke, although hard, is light and porous and weighs about the same as horizontals, which is 8 lbs. less than that made by intermittent verticals.

J. H. Taussig,
Engineer of Design,
United Gas Improvement Co.

Answer No. 2:

The character of tar varies within wide limits, depending upon the coal used, and, upon the size and shape of the retorts, the travel of the gas over the hot surfaces and the temperatures to which the gas is subjected. In general, subjection of the vapors to the higher temperatures usually characteristic of a gas works as compared with a coke plant is accompanied by an increase in specific gravity and free carbon. The writer believes that the kind of coal has less effect upon the quality of the tar than the other conditions named.

While some of the products of coal tar, such as carbolic acid and benzol with their homologues, napthalene, pyridene, etc., are definite chemical compounds and hence are always the same, by far the greatest portion of the tar is worked up into cruder products obtained by fractional distillation and which vary in composition with the tar from which they are produced. Therefore, in considering the value of any given tar, it is necessary not only to determine the amount of the definite chemical products, but also the value of the other products, more especially creosote oil and pitch.

Crude Tar: The uses of crude tar are very limited. Some tars whose content of water and free carbon is not excessive have been satisfactory for pipe coatings, while others have not worked well. Crude tar is not usually suitable for road treatment. Mr. Hubbard of the United States Office of Public Roads says that it is not even economy to attempt the application of crude tars when not sufficiently liquid to apply cold, and few tars except water gas tar could be applied cold. Crude water gas tar is only suitable for road treatment as a temporary dust layer.

Dehydration: Slow heating in storage tanks separates a part of the water by gravity, leaving, according to the writer's experience, 7 or 8 per cent. unless the tar is unusually high in free carbon when 20 or 30 per cent. of water may be retained. Removing the water by distillation is effective but expensive and it is better practice to drive it off by heating a thin film of tar.

Light Oil Products: The first fraction from distillation yields products lighter

ANALYSES OF TYPICAL TARS.

Origin.	Sp. Gr. at 15.5° C.	Free carbon.	Oil to soft pitch 60° C. per cent. by Vol.	Pitch residual 60° C. per cent. by Vol.	Refractive indices at 60° C.	Tar acids per cent taken on oil.
Horizontal retort	1,293	37.5	.....	.....	.....	....
Inclined retort	1.238	24.3	14.3	85.7	1.5807	21
Vertical retort	1.153	.....	28.8	71.3	1.5755	29
United Otto oven	1,207	13.3	21.2	78.8	1.5987	12
Semet-Solvay oven	1.188	10.7	21.8	78.2	1.6122	4
Lappers oven	1.186	6.8	35.3	64.7	1.6139	....
Eastern water gas	1.083	0.1	43.1	56.9	1.5678	....

than water and constitutes the source of most of the highly refined substances referred to as definite chemical substances. Analyses of 26 tars of various origins yielded an average of 2.4 per cent. of light oils. In working up these light oils, approximately 40 per cent. of benzol, toluol and heavy solvents is obtained, averaging about 1 per cent. of the tar. It is customary to work up the refined products at one central plant which receives the light oil from various refineries. The production of pure benzol and kindred products requires an expensive installation and includes re-distillation, treatment with sulphuric acid and alkali, and steam distillation to separate the various products and to secure pure products of constant boiling point.

Benzol and similar products are used in many industries and have to meet rigid requirements as to purity. The different grades of "benzols" made at one refinery are: Pure benzol, boiling at 80.82° C., 100 per cent., 90 per cent. and 50 per cent. benzol, 100 per cent., 90 per cent. and 50 per cent. respectively boiling at 100° C.; pure toluol, boiling at 110° to 112° C.; pure xylol at 135° to 145° C.; solvent naphtha, 90 per cent. at 160° C.; heavy naphtha, 85 per cent. at 200° C.

Carbolic acid is another refined product derived from coal tar light oil, and which, in manufacturing, requires careful manipulation involving a number of re-distillations, the last under vacuum.

Napthalene is still another pure product of the light and middle fractions. The crude napthalene, after removal from the oil by freezing, filtering or passing through centrifugal machines, is re-distilled, chemically washed and crystallized or sublimed. It is marketed in various forms as flakes, moth balls, etc.

Creosote Oil: This formerly included the entire distillate after removing the small light oil fraction. In America it is usual to carry on distillation until the pitch is of the proper constituency. The average distillation test of these oils in making soft pitch is 18 per cent. distilling at 210° C. and 57 per cent. at 235° C., while with hard pitch it is 11 per cent. at 210° C. and 43 per cent. at 235°. In practically all specifications the controlling requirements are simply the origin of the oil and its distillation range. There are, however, numberless specifications, more or less exacting, covering these points.

The "middle oil" fraction is usually high in tar acids and naphthalene and without further treatment has very little value. Modern practice includes the removal of these acids by agitation with caustic soda, gravity separation of the extracted oil and sodium carbolate, and liberation of the acids by passing carbon dioxide through the material. The oil is then often treated by freezing or mechanically for removal of naphthalene which goes to the plant where the refined products are made.

Refined Tar and Pitch: The more common residual product in regard to hardness is refined or soft pitch for roofing felt, the latter made by passing a sheet of paper through a bath of hot tar or pitch by unwinding from the roll, then passing between heavy squeeze rolls and then winding directly on the spindles. The saturating material must be held within very definite limits as to viscosity and percentage of insoluble material. But few tars by themselves make a good saturating material, and it is generally necessary to combine two or more to secure a desirable product.

Refined tar for road sufacing varies from a thin product that can be applied to a pitch having a melting point of over 100° F. In road tarring the distiller is confronted with having to meet innumerable specifications, some reasonable and others the reverse. There are many different methods of testing road tars, and too often the specifications are not clear as to the method required. In any case, the binder is usually blamed if the road fails, and all tar binders receive a setback in that locality.—Abstract from paper by S. R. Church.

218—Hard Cements.

Can you suggest a good cement simple to mix that will resist acid and withstand some shock?

One of the most simplest hard cements is the well known mixture of litharge and glycerine made to a stiff paste. It sets hard as a rock and is oil proof. A solution of water glass mixed with powdered calcium carbonate serves the same purpose. A mixture of boiled linseed oil and fire clay resists acid better than most cements, though sulphur melted with glass powder is also ranked as very resistant to chemicals in general. A good stone cement is made by mixing two parts of magnesium oxide, one part of magnesium chloride, powdered stone to suit as a filler and water to make a stiff paste. Basic magnesium chloride is formed.

222—Pulleys and Belts.

Do you know of any simple contrivance that can be attached to a pulley that will prevent a belt from running to the side?

This difficulty has been overcome by cutting a groove in the face of the pulley. The groove is cut on a lath with a round-nose cutting tool and cuts about ⅛ inch deep. This groove is spiral in shape and runs from the center or crown of the pulley to each side. With this cut you permit the air, which gets entrapped between the belt and pulley face, to escape. The air acts as a cushion and raises the belt above the pulley, for unless it is liberated the belt will have a tendency to run to one side. This scheme has eliminated that fault.

217—Economy of Compression.

What effect has compression on manufactured gas?

If coal gas were a single "permanent" gas, or even a dry mixture of such gases, compression would simply reduce its volume in accordance with Boyle's law, the volume varying inversely as the absolute pressure. Compression of a gas generates a certain amount of heat, while its expansion absorbs heat, reducing the temperature. If the compression be comparatively slight the heating effect need not be considered, but where compression to high pressures is accomplished, the apparatus is usually water jacketted to keep the temperature down, and absorb the heat as fast as it is produced.

Where, however, the gas being compressed, e. g., coal gas, contains water vapor and the vapors of hydro-carbons, etc., which themselves are liquids or solids at the ordinary temperatures, compression causes a reduction in the amount of these vapors which can be held invisibly as vapors. Consequently it generally happens that some of these condense out as liquids or even solids. A given volume of a gas can hold, for example, a definite weight of water vapor for each degree to which its temperature attains. This amount depends on the space occupied by the gas and not on its real volume or its weight. Consequently if a given volume of a gas can be compressed to half its volume it can only hold half as much water vapor as it could have done before its compression. The same rule holds good for other vapors.

The liquids produced in the compression of coal gas are water, with a much smaller amount of light hydro-carbons, (benzol, toluol, etc.,) and often a good deal of naphthalene, which mostly remains dissolved in the light oils. A small loss of calorific power is thus occasioned and a rather greater decrease of illuminating power.

Two important results are to be noticed in the distribution of such gas when allowed to pass through reducing governors and fall to ordinary low pressures. The gas having been deprived of a good deal of its water vapor, is able, now that it is expanded, again to take up at least that amount and is eager to do it. This it will do if it is measured through wet meters, and arrangements must therefore be made for watering these more frequently than would be necessary with an ordinary gas supply.

Such gas having been deprived of much of its water and its naphthalene by compression, is much less likely to cause naphthalene blockages for two reasons. First, it is not likely to deposit its small amount of remaining naphthalene (not now being saturated), by any cooling it may experience; in fact, it will probably take up and thus clear away some already deposited. Secondly, as the condensation of water vapor seems to have a striking influence in assisting in the precipitation of naphthalene, the comparative dryness of this gas is a safeguard against this unwelcome action.

Illinois Council of Defense Trying to Solve Coal Situation.

The working offices of the Illinois State Council of Defense are at 120 West Adams St., the old Edison Building. The council has taken up the acute coal situation. It has forced the railroads and the coal operators to get together on a joint committee and map out a program that is expected to increase production in the Indiana-Illinois field by 25,000,000 tons the coming year as well as speed up distribution so that the coal shortage difficulties of the past season will be eliminated.

Canada's Experience With Coal Under War Conditions.

The production of coal in Canada during 1915 was 13,267,023 short tons (11,845,556 long tons) valued at $32,111,182 or an average of $2.42 per ton, as compared with a production in 1914 of 13,637,529 short tons (12,176,365 long tons) valued at $33,471,801 or an average of $2.45 per ton, and a production in 1913 of 15,012,178 short tons (13,403,730 long tons) valued at $37,334,940 or an average of $2.49 per ton, according to the report of the Canadian Department of Mines. The falling off in 1915 from the previous year was 370,506 tons, or 2.7 per cent., while compared with 1913, the year of greatest production, the decrease was 1,745,155 tons, or about 11.6 per cent.

COURTS-COMMISSIONS

Matter of Alleged Poor Service Up to Commission.

In the case of the City of Scammon, Kans. vs. the American Gas Co., the gas company supplying several cities had for years, under a franchise with the city of Scammon, supplied gas to a street lighting company; the latter paying for all the service pipes leading from the gas company's posts in excess of 50 feet from such mains. Such service pipes becoming leaky and dangerous, the gas company turned off the supply from thirteen of the sixty-five posts. The city, by ordinance, directed the gas company to repair and maintain such service pipes, and to restore the supply of gas, and upon refusal sought by mandamus to compel obedience. The court finds that such controversy should be submitted to the Public Utilities Commission under Sec. 20 of chapter 238 of Laws 1911, and is not a proper one to be controlled by mandamus in the first instance.

Validity of Monthly Minimum Charge Upheld by Commission.

In the complaint of the Village of Frankfort vs. the Utica Gas & Electric Co. as to readiness to serve charge (case No. 5917), the New York commission says: The propriety of a minimum monthly charge by both gas and electrical corporations has long been recognized in the State of New York, and the practice is now almost universal in the states where regulation of public utilities is in effect. A monthly charge of this character is justified because of the fact that there are certain fixed expenses which such a corporation is obliged to incur for each of its customers in the conduct of its business, regardless of whether the customer uses any gas or electricity during a particular month.

Detroit Gas Co. Seeks Reduction from 600 to 570.

The Detroit (Mich.) City Gas Co. asks permission to reduce the calorific value of its gas from 600 to 570 B.t.u. Victor F. Dewey, vice-president, says the quality of gas now supplied cannot be maintained at the present rates because of high cost of materials.

Gas Company Seeks Increased Charge for Laying Service Pipe.

The Citizens' Gas Co., of Indianapolis, has filed a petition with Carl H. Mote, secretary of the public service commission, in which approval of a supplemental schedule of regulations "entering into the rates and charges for gas and service thereof in the city of Indianapolis, and parts of Marion county, contiguous to the city. The proposed new schedule follows:

For pipe not over 1¼ inches in size, 30 cents a foot; for 1½-inch pipe, 35 cents a foot; for 2-inch pipe, 45 cents a foot; for 2½-inch pipe, 60 cents a foot; for 3-inch pipe, 75 cents a foot; for 4-inch pipe, $1 a foot. The schedule provides that a minimum charge of $7.50 will be made for laying service pipe, and a minimum charge of $5 each for laying two or more service pipes within a single city block at the same time for the same person.

"Additional charges will be made for digging through high embankments or for other conditions involving unusual expense in installing the pipe," the petition says, and it declares that "the above charges are based on the estimated amount of the actual cost of service."

The new prices proposed represent heavy increases over former prices, which ranged from 15 cents a foot to 25 cents a foot for putting in pipe from 1¼-inch size to 2-inch size. The other sizes also represent large increases over former prices of the company. Company officials said that the proposed increases were based on the increase in the prices of iron products, and that the company, in proposing the new prices, had not taken into account increased labor charges.

ORGANIZE FIGHT.

League of Municipalities Will Oppose Public Service Co.

The New Jersey State League of Municipalities has prepared to fight any movement for an increase in the price of illuminating gas or a reduction in the standard. Representatives of Jersey City, Paterson, Passaic, Elizabeth, Plainfield, Ridgewood and Newark, attended a meeting recently, at which plans were discussed to combat the proposals now before the Public Utility Commission. On motion of Mayor Calkins, of Plainfield, it was decided to have the league offer its services to all the municipalities of the state to organize for the fight and share in its cost, which will not exceed 1 per cent. per capita. The city counsels will force the fight and will have the assistance of George L. Record. The Utility Commission will be asked to continue the hearing until after the vacation period.

Receiver's Report on E. Syracuse (N. Y.) Suburban Gas Co.

James B. Tracy, receiver for the East Syracuse (N. Y.) Suburban Gas Co. reports that the company, which was forced into bankruptcy Jan. 8, 1916, shows a total value of $33,235.23. Upon being elected trustee of the property in March, Mr. Tracy received $13,337.49, paying out $10,815.40. There is now a balance on hand of $2,522.09.

Illustration of the Economy of Gas Coke as Fuel.

Deptford, England, which in March, 1916, introduced the London Coke Committee's apparatus for burning gas-coke in the steam boilers at the public baths, reports the following result of a year's working with coke exclusively as fuel. The cost of coal for twelve months from March, 1915, to March, 1916, at the current price of coal, would have been $8,694.18. The cost of gas-coke from March, 1916, to March, 1917, has been $7,003.54—amount saved, $1,690.64. The saving, which is equivalent to 19.4 per cent., would have been greater but for the large increase in the heating and electric lighting of the buildings owing to the very cold and dark winter, and to the increase in the number of warm baths used, estimated at over nine per cent. The financial saving, despite the adverse circumstances, has exceeded the estimate made by the local gas company who supplied the coke-burning apparatus, which was fitted to the boiler by the bath's staff at a total cost of about one-tenth of the saving effected during the first year. From the national standpoint, the saving effected by the patriotic action of the city in using gas coke in lieu of raw coal is in the by-products recovered by first treating the coal in gas retorts. The by-products recovered from an equivalent quantity of coal so treated include: 1,440 gallons of benzol, 9,600 gallons of coal tar, and 10 tons of sulphate of ammonia (fertilizer).

Indiana Association's Petition Before the Commission.

The Indiana public utilities on July 11th began the hearing of a petition introduced by the Indiana Gas association on behalf of its individual members, asking that the standard of heating units be reduced. The hearing, at Indianapolis, resulted in a continuance of thirty days being granted, at the conclusion of which time the members of the commission stated the commission will endeavor to come to some conclusion in the matter.

The point at which the conference hung and which resulted in the continuance, was a question of the jurisdiction of the commission to fix rates without such matters having been first considered by the municipalities concerned. Twenty days of the thirty-day continuance was granted to cities in which to prepare a brief attacking the jurisdiction of the commission, while the remaining ten days was granted to the gas association in which to file an answer.

NEW PRODUCTS

[illegible] WORK.

Russel Engineering Co. Makes Report on Reconstructing St. Louis Gas Works.

[illegible] the reconstruction work at the Laclede Gas Light Co.'s works at St. Louis. The work of the work includes the reconstruction and remodeling of the stacks of the retorts, each of which will have the grate surface of the furnace, [illegible] the discharging and [illegible] of the retort furnaces. The furnaces are designed to give a large amount with straight side walls and having ample grate surface. The design makes low over combustion and consequently gives an even low and at even quality of producer gas. The furnace grates are constructed of silica blocks and have graduated air boxes. This feature together with the improved arrangement and the design of the settings, gives an even distribution of heat throughout the full length of the retorts. The capacity of these two stacks will be approximately 1,500,000 to 2,000,000 cubic feet of gas per twenty-four hours.

Although the contract of this work calls for completion of the first ten benches on September 12, 1907 and the second ten benches on February 12, 1908, it is expected that the first half of the work will be completed by September 1, 1907 and the second half by December 1, 1907. The contract for the work is being executed by the Russel Engineering Co. of St. Louis.

Motorcycle Service Car for Gas Companies.

The illustration herewith of the new Lignet gas car car model "C" service type, is of special interest and has found instant favor with gas companies, plumbers, supply houses, electrical contractors, gas-stove companies and many miscellaneous contractors of different sorts. It is especially suited for the transportation of tools and supplies of any kind from one point to another. As seen by the illustration, the Lignet car is built with doors opening both at the front and at the rear. This arrangement for gas companies makes it possible to carry lengths of pipe and other material considerably exceeding the length of the body of the car with the driver seated in the side of the motorcycle. The seat immediately back of the motor cycle driver is an especially noteworthy feature and easily accommodates two passengers so that a gas fitter and his helper can be taken to a job instantly. The motor of Lignet car is built for attachment to any standard make motorcycle and is also equipped with brake for use where there is congested traffic and use a fan which protects the motorcycle driver. Before this car was placed in the market, one was put in service with an electrical contractor of Buffalo, who used it during the severe weather of the past year with satisfactory results. Other users of "Lignet" car have reported gasoline consumption of 40 miles per gallon.

BLOW TO GAS ENGINES.

Ohio Natural Gas Companies Cutting Them Off—Fight to Continue as Domestic Consumers.

A serious situation exists at present among the natural gas companies of Ohio in regard to engines and their users. The East Ohio Gas Co., of Cleveland, which furnishes perhaps half the natural gas used in the state for power, has given notice that its contracts for furnishing power, all of which terminate Jan. 1, 1907, will not be renewed. The Ohio Gas & Fuel Co. also gave notice last week that it would serve no notices now in force. The Bryce-McBride Co., engine makers of Cleveland, through John F. Vogel, attorney, has applied to the Ohio Public Utilities Commission for an injunction against the cutting of its internal combustion engines, claiming that gas engines should be classed with domestic consumers. Two of the nine large Ohio companies heretofore have classed engines as domestic.

Combustion Engineering Corpn's New Bulletin on Stokers.

The Combustion Engineering Corp'n, New York, has issued a 24-page bulletin on its stokers. The coal is fed into a hopper by either hand labor or coal conveying machinery and conveyed under the hopper by a reciprocating sliding bottom of the feed trough, or a ram which runs the full length of the stoker. It is distributed to the sides of the furnace by moving bars, which constantly slide it off its ash on running trays along the side. The sliding bottom is driven by a steam piston, the cylinder of which is bolted to the stoker frame under the hopper.

Value of Acetylene Cutting and Welding About the Plant.

An illustrated bulletin by the Oxweld Acetylene Co., Newark, N. J., gives various instances of the application of welding apparatus to modern shop practice and repair work. Points emphasized are the rapidity with which repairs can be made, the salvage of scrap, the repair of defective castings, and the correction of machine and pattern shop errors. Cars and description of cases of welded broken parts, together with a statement of the cost of welding and the time and money saved are used to demonstrate the value of acetylene apparatus.

Another one of the time labor saving ideas that are going to figure so prominently in gas plant war-time operation is the elimination of shoveling coke in gas production. The Venturi Meter has been successfully used in the process gas plant in this work. The Simplex Iron Foundry, Providence, R. I., will gladly furnish full details of the method to interested gas men.

The Iron Process Stove Co. has a hand book in the design of its "Seven Season" heaters. One of the features of this guidance is the protecting screen which consists of perforations.

[illegible] will stand a chance in the gas [illegible] to reach, but it takes a "Chambers on war time" knowing to be makers of the guidance which are going [illegible] courageously. The Process cooking-gas guidance is getting a strong hold on the gas field and is being [illegible] a good conservator of gas.

Motorcycle Service Car for Gas Companies.

Automatic Gas Fired Boilers Produce Desirable Business.

During the past few years, the Montreal (Can.) Light, Heat & Power Co. has installed a great many automatic gas fired boilers as well as installed gas burners in boilers which the customer already had. Today the company has a total of over 100 gas fired boilers totalling more than 200 H. P., through which it derives a revenue from the sale of 30,000,000 cu. ft. of gas per year. In most of these cases gas fired boilers have replaced coal fired boilers of a much larger capacity and have not only proved cheaper on fuel basis, but also have eliminated the carrying in of fuel, kindling of boiler, constant attention which a coal fired boiler requires during the day and the carrying out of ashes, besides giving the customer the exact steam pressure which he requires during all hours of the day instead of having variations of steam pressure which he is bound to have where a small coal fired boiler is used.

Metric Metal Trophy.

Metric Trophy Presented Doherty's Men.

Here's the shield that the Henry L. Doherty natural gas men won for totaling the greatest number of miles traveled in seeing the Natural Gas convention at Buffalo. The Metric Metal Works, donors of the trophy, have presented it to Mr. Doherty, in whose office it now hangs.

Zander Machine Described.

"Modern Refrigeration," a booklet by John Zander, treats of the various features of the Zander automatic gas refrigeration machine. This book is a summary of the case for refrigeration with gas and contains much material of importance to new business men. A copy of the publication will be sent free by the Zander Refrigeration Co., Peoples Gas Bldg., Chicago.

Scientific Heater Co. is Preparing Campaign.

The Scientific Heater Co. is lining up the gas companies for the big cold weather campaign on garage heaters. All the signs are favorable for this event. The automobile papers are full of stories indicating the popularity of the sedan body and other ideas that promote year round motoring. The garage heater has proved a profitable proposition and backed up by the national advertising and efforts of properly prepared salesmen, there is no reason why it shouldn't prove

What a warm garage means in the operation and life of your car

Convenience and comfort in the winter operation of your car is made possible by installing a Scientific Safety Garage Heater. It puts an end to the annoying delays and trouble in cold weather starting. It saves gasoline, prolongs the life of your car, and makes it easier on the engine, as well as on your pocketbook. The Scientific Garage Heater keeps your garage at a comfortable temperature, so that you can work in it comfortably, and repair your car in perfect comfort at every time.

Economy and efficiency in the life of your car is another equally important advantage of a garage warmed by the Scientific Garage Heater. A warm garage takes the place of the usual garage stove, and saves much fuel. It prevents the engine from being chilled, and keeps the oil in the crankcase from congealing, so that it will not be necessary to remove the oil every morning and heat it before starting the car. The Scientific Garage Heater saves gasoline, and saves delays and annoyance in cold weather starting.

"Scientific" Safety Garage Heater

Order Now to Insure a Warm Garage All Winter

The Scientific Heater Company

Cleveland Ohio

FOR SALE BY

ALL GAS COMPANIES

The Standard Appliance for Warming Garages

Use the enclosed Post Card to-day

Scientific Heater Folder.

to be worthy of vigorous campaigns. The Scientific organization has combed the field for garage heater selling ideas and has embodied them in loose leaf form. This portfolio embodies mail and newspaper advertising material, window displays, educational work, instructions to salesmen, etc. A copy will be sent in the near future to every new business head. The whole advertising campaign is built around the idea of getting the inquiry and turning them into sales with the suggestions advanced in the Salesmen's Manual and New Business Manager's Folio. A request for the Scientific Garage Heater advertising and sales plans will bring the whole story from the Scientific Heater Co., Cleveland, O.

No chance of the busy gas man forgetting D. McDonald & Co., meter makers of Albany, N. Y. This company has sent out into the field a number of combination calendars and memo pads that are sure to be in constant sight and use.

The Otis Automatic Push Button Skip Hoist is the object of considerable attention among gas engineers due to the curtailment of labor that follows the enactment of the draft. The Hoist has been successfully employed by a number of gas companies and has the additional backing of the famous reputation to earn a hearing for it.

"Quick Comfort Gas Heaters this year come from the Ringen Stove Co., div. in three sizes of the copper reflector type, an asbestos back type and an incandescent fuel type with full return flues and cast iron fire box.

The Clow people certainly are going after gas heating business for their gas company customers. The Clow Gas-team radiator has a fine story for householders and others who have heating to be done and this story has been worked into attractive advertising form for gas company use.

APPROVE "LIBERTY GLOW"

Early Demand for the New Heater Indicates Widespread Need for It.

Liberty Glow, Columbus, O., reports a growing demand for the new fireplace copper reflector gas heater. This is somewhat surprising in view of the normal attitude of gas companies toward early buying, a majority of them preferring to wait until fall before placing orders. But the timeliness of the "Liberty Glow" heater, its peculiar fitness for the widespread conditions arising from the shortage and the high price of coal, and its moderate cost to gas companies all combine, no doubt, to make it exceptionally attractive and therefore gas companies must feel that early buying of this appliance is a wise move. The manufacturers state that most of the large companies have samples already coming through their testing laboratories and that general approval of both material and construction is at hand. The stock of material for manufacturing these heaters, they write, is limited and present quotations apply only so long as this stock lasts.

An interesting feature of their campaign is the fact that no salesmen will call on the trade during the war emergency period. The heater must sell itself, in order to keep down costs to both gas company and consumer. This interesting experiment will be watched with considerable interest by the industry.

"Liberty Glow," the New Fireplace Heater.

PATRIOTIC GLOUCESTER.

Red Cross Contribution Raised by Welsbach Manager Record for U. S.

The Welsbach boys certainly know how to campaign—it matters not whether for C. E. Z. lights or patriotic Red Cross dollars.

Welsbach Red Cross Team Who Helped in Raising the Record Fund for Gloucester.

Generals Manager Stites of the Welsbach Co. captained the team for Gloucester City in connection with Camden county's Red Cross campaign week, and was assigned the task of collecting $11,000 from the town's population of 10,000 working people. His team made doubly good by turning in $21,533, a per capita contribution of $2.15, exceeding the town's allotment by 96 per cent., thereby winning first place against two dozen competitive teams, including the Victor Talking Machine and the Campbell Soup teams. The teams of three big nation-wide advertisers—Welsbach, Victor, Campbell—finished in the order named.

Captain Stites says that Gloucester City is proud of its local victory, but Gloucester is not willing to stop there, and claims that Gloucester City is in first place in the percentage of excess in its contribution over its allotment and its per capita contribution based on per capita wealth over any and all cities, towns or boroughs throughout the entire United States.

Mr. Stites, as captain, organized the Gloucester team and laid out the details of the campaign. A poster was originated and displayed all over the town. A folder, setting forth the reasons why Americans should give up their dollars for the Red Cross, was issued by the Gloucester team and distributed to every house and store. Big canvas banners were hung across the streets in the Welsbach plant.

The closing day of the campaign developed something in the nature of a whirlwind finish as the race between the Welsbach and Victor teams was seen to be a close one. The Victor team employed every imaginable means of enlarging their contribution. But the Gloucester people themselves kept pouring in the money that landed them in first place.

The final effort on the part of Mr. Stites' team was in the form of a Red Cross dance held on the roof garden of the Welsbach plant. This event proved to be an impressive spectacle. An enormous, illuminated Red Cross was elevated over the roof garden. The big flag over the main office was flood lighted and gave a truly startling effect of floating brilliance against the night sky. This festive and colorful scene high in air over the world's greatest gas lighting institution attracted attention and occasioned favorable comment for miles up and down the Delaware.

The Welsbach factory employes also have a record on Liberty Bonds, having subscribed for $66,000 worth.

Evansville Bank Bids in Princeton (Ind.) Gas Plant.

The property of the Consumers Gas Co., at Princeton, Ind., was sold at receiver's sale recently to the Citizens' National Bank of Evansville for $40,000. The plant will be continued in operation.

Donaldson Iron Co., Emaus, Pa., Increases Capital $200,000.

The Donaldson Iron Co., Emaus, Pa., has increased its capital stock from $200,000 to $400,000. The company is under the management of John D. Ormrod, who succeeded his father, the late Capt. Geo. Ormrod, as president.

Gloucester Girls Who Collected Red Cross Funds on Atlantic City and Cape May Highway.

Results of War

Great Progress to Be Achieved Through Its Lessons for Industry

The technical men of the gas industry have been put upon their mettle during the war, says an Editorial in the London Gas Journal, and they will be put upon their mettle with equal intensity after the war, if we judge the signs correctly, to meet the competition for business and to carry the industry into its proper place in the country's work and service. It is patent that it is through its processes that economy and cheapness must come; and it is upon this course of the current of movement that the plant manufacturers must keep an eye, and prepare accordingly. It is just possible that the temperatures of coal carbonization will be somewhat reduced, and consequently a lower quantity but richer gas, free from all avoidable inert constituents, will be produced per ton of coal carbonized. This will not affect the yield of those commodities which the country requires, and which will necessitate the continuance of oil-washing. It will reduce, too, the wear and tear upon the retort plant. The make per ton of coal will be supplemented by a percentage of water gas which will dilute the coal gas without adulterating it—in fact, will probably diminish the inert constituents in the bulk. This appears to be the likely line of gas development to achieve economy, while giving the consumers a useful heating gas. It will lessen the quantity of expensive coal and (where used) oil required per unit of gas production. It will influence, too, the character of the coke and the production of residuals generally, and help to improve the markets for them. Every means must be taken to reinforce the position of the industry. Through any economy that can be achieved (by manufacturing processes and residuals) upon the conditions that may at the time be current, the industry may hope to enlarge its business. Enlargement of business will mean the provision of more plant and appliances of all kinds, and more to be kept in repair. Though, by the aid of blue water gas or lightly carburetted water gas, less coal-carbonizing plant would be required per unit of production, this, it may be hoped, would be compensated by the growth of business. Upon this, the manufacturers of plant have to keep their eyes, as well as upon the movements in connection with oil-washing plant, distillation plant, tar-dehydration plant, the need for good capacity in condensing plant, and all that extended business claims. The makers of gas-using appliances of every description should study the prospects in connection with their goods, and should not now send out a single piece of apparatus without an air-regulating device upon it, as well as be prepared to supply such regulating means for all existing appliances. Gas production is now undergoing fresh investigation and experiment; and experience is being gathered through the impelling force of present circumstances. Fresh ideals have been and are being formed by gas men. Parliament will be approached with all the arguments that have been thrust upon the gas industry by the war, by the new circumstances and by the wisdom which the opening of the eyes of the nation has aroused, and which says that the country must throw off the shackles of its old ways, and adopt new. The Ministry of Munitions, the Coal Controller's Department, British Dyes Limited, the motor fuel industry, German ambitions in industrial and trade domination, and, last but not least, the power of submarines, have one and all put into the possession of the gas industry arguments to which there is no reply, and which can be used in the cause of greater liberty—liberty dictated by science and by national service, and not restricted by the predilections or whims of politicians, nor by the influences fashioned by obscurantism or by the selfish interests of opposing industries. By all men concerned in the progress of the gas industry, these matters should be noted, and have assigned to them their true value. They are impellents in that progress, and to reject them, or not to make full use of them, will be disastrous. Opportunities must not be lost; and best use will be made of the opportunities by those who work up to the precept, "Look Forward, and Be Prepared." The results of the neglect of the precept are illustrated by the war in painful manner.

Tar Distilling

Co-operative Idea Gaining Ground Because of Distillers' Poor Prices

There appear to be signs of a little uneasiness among tar distillers, says the London Gas Journal, and we rather fancy there are good grounds for it. They have never before troubled to approach the gas industry with a scheme ostensibly framed for mutual advantage—though, now that they have come forward with one, the weight of advantage, faithfully following precedent, is on the side of the distillers. It is perfectly certain that they would not have introduced even an unacceptable scheme unless they had some misgivings as to the future. They know that in the past there have been lean payments for tar, and many undertakings have acutely felt this leanness. They know, too, that new conditions have arisen in the gas industry—that many undertakings engage to-day in tar dehydration or first-stage distillation, and that they sell the treated tar locally for road purposes. They are also aware that more of the large undertakings are making inquiries for complete tar-distilling plants. They have knowledge of the discussions as to co-operative distillation; and they are cognizant, too, of the fact that, despite one-third purchasing restrictions, it is quite possible to form independent companies of gas share-holders to carry on tar distillation in a given area. There is a yearning now among some of the distillers (not all of them), to themselves become co-operators. But just as their prices have not always been those which the gas industry has considered fair, so their scheme does not commend itself. An alternative one has been suggested by the National Gas Council, which, however, if agreed to by the distillers, would not bind anyone who did not care to take it up. The committee dealing with the matter has been reinforced, and is asked to consider the question of an alternative scheme among tar producers where districts are suitable. It is a question of the most economical and paying procedure for each district. In some, as the Manchester Institution say the best method will be for the larger gas undertakings to be the centers for distillation. But the pending suggestion does not provide for areas where only medium and small concerns can be grouped. There need not be any trouble whatever about financing a co-operative movement. It could be arranged as an independently capitalized concern.

CANADIAN MEETING.

The Annual Convention at Toronto August 29th-30th.

With characteristic pluck and enterprise, the Canadian Gas Association will hold its 10th annual convention in spite of the prevailing war conditions. The event will take place at Toronto, August 29 and 30. The association had planned to hold their 1917 convention in Detroit at the same time the N. C. G. A. convention was in session, but the postponement of that event caused the officers of the Canadian association to select another time and place.

Secretary George W. Allen is already busy sending out attractive literature describing the points of interest about the meeting place, the beauties of the Royal Canadian Yacht Club on Toronto Island, where the annual dinner will be given and the sessions held, and also giving a list of the Toronto hotels with their rates and accommodations. Those who desire further details can secure same by addressing George W. Allen, 19 Toronto street, Toronto, Ont.

Royal Canadian Yacht Club Where Convention Will Be Held.

Sec. Allen, of Canadian Association.

Water Front Scene at Toronto.

National Exhibition to Be in Full Swing During Canadian Convention.

Underwriters' Suggestions Regarding Storage of Coal.

As a safeguard against spontaneous ignition of piles of soft coal, the Underwriters' Bureau of the middle and southern states makes the following suggestions:

1. Storage should be kept, if possible, well away from the main buildings of the plant. Under no circumstances should it be piled up against a frame building.
2. If outside space will permit, the piles should be made low (not higher than 12 feet), and of large area, rather than of small area and piled high.
3. If wet coal is received, it should be dumped around the edges of the pile, or in some location where the air can get to it freely, and where large quantities of other coal will not be packed on top of it.
4. If large amounts are stored, it is a good plan to insert wrought-iron pipes two or three inches in diameter into the piles as they are built up. The lower ends of these pipes should be at different heights from the ground throughout the piles; probably one three-inch pipe to every 400 square feet of surface would be ample.

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Rate Advance General in U. S.

Movement for Adequate Rate to Meet Increased Cost of Gas Manufacture Is Successful in All Sections of the Country, Shown by Careful Survey

Unquestionably the movement of most importance in the gas industry of America just now is that looking to an advance in rates to consumers. In every part of the country, as the subjoined list will show, gas companies have either secured higher rates already by appeal to state or city authorities, or their appeal is pending or they contemplate making the request. This list was compiled from data sent in by managers of the companies represented, THE GAS RECORD having sent out a request for this data to every gas company in the country. It is to be assumed, therefore, that approximately every company that has advanced its rates, made application for advance or intends to apply for advances, is in this list.

Following is the list by states:

California.

Ukiah—The Ukiah Gas Co. has requested state commission for authority to increase their minimum charge from $0.50 to $1.00.

Fowler—Fowler Gas Co. in past three months increased rate from schedule of $1.00 to $1.25 per M. to schedule of $1.10 to $1.60 per M.

Hemet—Southwestern Gas Co. will ask for increase from $1.50 and downward scale to schedule of $2.00 down to 80 cents per M.

Connecticut.

Wallingford—Wallingford Gas Light Co. increases from $1.25 net to $1.40 per M; for 50,000 feet, from 80 cents net to $1.25; and for over 50,000 at $1.00 net.

Thompsonville—North Connecticut Light & Power Co. decreases discount for prompt payment from 10 cents to 5 cents August 1, 1917.

Florida.

Gainesville—Co-operative Ice Manufacturing Co. increases from $1.40 per M to $1.75 per M.

Indiana.

Brazil—The Brazil Gas Co. has applied for a maximum rate of $1.50 per M with minimum charge of 75 cents. Former rate, $1.50 per M with minimum charge of 50 cents. Hearing by commission June 19th.

Princeton—Consumers Gas Co. granted following increased schedule of rates by commission: First 5,000 cubic feet (artificial), $1.25 per M; 5,000 to 10,000 $1.15 per M; 10,000 and over, $1.00 per M Minimum charge, $1.00 per month. Natural gas, $1.00 per M. Effective May 20, 1917. Former artificial rate, $1.00 per M.

All company members of Indiana Gas Association have applied for reduction in B. t. u. standard requirements, through the association.

Iowa.

Waterloo—Citizens Gas & Electric Co.: At conference of officials of gas company and city officials an investigation was ordered to determine justification of increase in rate.

Independence—Independence Gas Co. are asking city authorities for increase from $1.45 (net $1.35) to $1.75 (net $1.65) per M.

Waverly—Waverly Gas Co. increases from $1.40 net to $1.65 net per M.

Marengo—Marengo Gas Co. increases from $1.35 to $1.85 net, per M.

Shenandoah—Peoples Gas Co. contemplate asking for increase in rates.

Kansas.

Independence—Independence Gas Co. granted following increased schedule of rates by commission: First 5,000, $1.25 per M; 5,000 to 10,000, $1.10 per M; 10,000 and over, $0.95 per M. Minimum monthly charge of 75 cents. Former rate, $1.10 per M with minimum monthly charge of 25 cents.

Iola—Gas Department, Public Utilities, will increase from 25 cents to 28 or 30 cents per M.

Kentucky.

Ashland—United Fuel Gas Co. petitions state commission for a 33⅓ per cent. increase in rates.

Winchester — Central Kentucky Natural Gas Co. increases to 38 cents per M, net, September 1st.

Maine.

Bangor.—Bangor Gas Light Co. petitions commission for increase of 25 cents per M. Became effective May 10, 1917.

Maryland.

Crisfield—Crisfield Light & Power Co. increases from $1.25 to $1.75 per M, July 1, 1917.

Baltimore—Consolidated Gas, Electric Light & Power Co. files supplementary schedule increasing charges for gas and electric main extensions from 70 cents to $1.10 per lineal foot; excess service pipe from 20 cents to 45 to 65 cents per foot, depending on size. Length of free extensions unchanged.

Massachusetts.

Cambridge—Cambridge Gas Light Co. announces increase of 10 cents per M in price of gas, making net price 90 cents per M. Effective July 2, 1917.

Westfield—Westfield Gas & Electric Light Works increases from $1.00 to $1.25 per M.

Wakefield — Wakefield Municipal Light plant will ask for increase from $1.25 to $1.30 per M, net.

East Braintree—Old Colony Gas Co. increased from $1.35 to $1.50, gross, July 1, 1917.

New Bedford—New Bedford Gas & Edison Light Co. increases from 80 cents to 95 cents, net, per M, August 1, 1917.

In addition to above the Massachusetts commission has announced the following changes: Holyoke (municipal company), 90 cents to $1.00; Worcester, 75 cents to 85 cents; Springfield, 85 cents to 90 cents; Ware, $1.50 to $1.75; Amesbury, $1.50 to $2.00; Quincy, $1.10 to $1.20; Malden, 90 cents to 95 cents; Revere, 90 cents to 95 cents.

Michigan.

Marshall—Marshall Gas Light Co.

will increase 15 cents per M, September 1st.

Minnesota.

Austin—Austin Gas Co. will ask commission for advances in rates in the next 60 days.

Missouri.

Independence — Jackson County Light, Heat & Power Co. has changed its rates as follows: Former schedule, 25 cents per month, minimum up to 10,000 cubic feet $1.15 per M; over 20,000, $1.00 per M; over 40,000, all net. New schedule, 75 cents per month. minimum; up to 5,000 cubic feet, $1.15 per M; from 5,000 to 10,000, $1.00 per M; all above 10,000, 80 cents per M, all net. Gross, 10 cents per M higher.

New Hampshire.

Portsmouth—Portsmouth Gas Co.: Rates increased to $1.20 net per M first 10,000, $1.00 net per M next 20,000, 90 cents net per M over 30,000. Service charge of 50 cents; 10 cents discount on all rates for prompt payment. Effective July 1st.

The Public Service Commission lowers the minimum B. t. u. requirement from 600 to 565 B. t. u. on account of the abnormal price of materials. Effective April 1st.

New Jersey.

Boonton—Boonton Gas Light & Improvement Co. petition Board of Aldermen for increase in rate from $1.35 to $1.50 per M. Meeting of consumers called at Town Hall to discuss same.

Newark—Public Service Gas Co. (and other New Jersey companies) petition for lower B. t. u. standard or permission to increase rate. Present B. t. u. requirements, 600. Commission hearing June 19th.

Atlantic City—Atlantic City Gas Co. has asked city for increase from $1.00 per M, gross, to $1.70 per M, gross; 90 cents per M, net, to $1.00 per M, net.

New York.

Hornell—Hornell Gas Light Co. increases rate 2 cents per M after June.

Le Roy—Pavilion Natural Gas Co. has not increased its rate of 40 cents per M, but has reduced its rate of discount for prompt payment.

Ithaca—Ithaca Gas & Electric Co. has asked for permission to add 50 cents service charge per M to its present rates.

Courtland—Homer & Courtland Gas Light Co. are asking for 50 cents additional service charge per month, September 1st.

North Carolina.

Elizabeth City—Southern Gas Improvement Co. increases rate from $1.50 to $1.75 per M.

Henderson—Southern Gas Improvement Co. had a sliding schedule as follows: $1.50 net for first 5,000 cubic feet, with 10 cents reduction on each 5,000 up to 25,000 cubic feet. Has increased as follows: $1.70 net for first 5,000, $1.50 for second 5,000, $1.30 for third 5,000, $1.20 for fourth 5,000, $1.10 for fifth 5,000, and $1.00 per M per over 25,000, effective June 1, 1917.

Goldsboro—Goldsboro Gas & Fuel Co. has increased from $1.35 net per M to $1.50 net per M.

New Bern—New Bern Gas & Fuel Co. has increased its fuel rate from $1.35 net per M, to $1.67 net per M. No change in illumination rate.

Fayetteville—Fayetteville Light & Power Co. has increased from $1.50 net per M to $1.75 net per M.

North Dakota.

Jamestown—Jamestown Gas Co. is negotiating with the city council for 25 per cent. increase in rates.

South Dakota.

Yankton—Yankton Light & Heating Co. will ask for increase from $1.50 per M to $2.00 per M.

Mitchell—Mitchell Power Co. will ask for increase from $1.75 per M to $2.00 per M.

Ohio.

Akron—East Ohio Gas Co. increases rates from 35 to 37 cents per M, covering Akron, Barberton and vicinity.

Delaware—Delaware Gas Co. has increased from 33 cents, less 3 cents per M, 10 days, to 38 cents, less 3 cents per M, 10 days. Effective September 1st.

Columbus — Columbus Natural Gas & Fuel Co. in the early spring filed rate increases with the Public Utility Commission of Ohio. The increase was from 11 cents to 16 cents, and this advance of 5 cents per thousand feet applies only to gas supplied for industrial uses.

Pennsylvania.

Newtown — Bucks County Public Service Co. filing new rate with 75 cents readiness-to-serve charge, flat rate of $1.40 per M with block system for large consumers. Old rate included block system, with flat rate of $1.50 per M. No readiness-to-serve charge.

Uniontown—Fayette County Gas Co. increases rates from 30 to 35 cents per M, effective April 26, 1917. Supplies Uniontown, Connellsville, New Haven, Dunbar, Dawson, Scottsdale and Mt. Pleasant.

Warren—Pennsylvania Gas Co. increases rate from 32 to 37 cents per M, effective May 1st. Supplies Erie, Warren, Corry, Sheffield, Pa., and Jamestown, N. Y.

South Carolina.

Rock Hill—Rock Hill Gas Co. is negotiating with city for increase from $1.40 net per M to $1.65 net per M.

Tennessee.

Chattanooga—Chattanooga Gas Co. is negotiating with the city for increase of 25 cents per M.

Wisconsin.

Eau Claire — Wisconsin-Minnesota Light & Power Co. petitions commission to make temporary increase in rates of 6 cents per M for each $1.00 increase in price of coal over $4.00 per ton.

Beaver Dam—Beaver Dam Fuel & Light Co. will ask for advance within next 30 days.

Canada.

Guelph—Municipal plant. Rates increased May 1, 1917, 15 cents per M.

Kichener — Light commission increases rate from $1.00 to $1.15 per M, March, 1916.

St. Thomas—Municipal plant. Increased price from 90 cents to $1.00 per M, May 1st.

Toronto—Consumers Gas Co. reduces discount for prompt payment from 30 to 20 per cent., making net 80 cents per M, March, 1917.

Coburg, Ont.—Central Ontario system has increased from $1.25 to $1.50 per M.

During the past year Doherty's Dominion Natural Gas Co. has increased its gas rates in all the Canadian towns which it serves, with the exception of Ingersoll, Brantford and Woodstock. The increases have averaged 5 cents per thousand feet. Similar advances probably will be made in those three towns, but rates will not be advanced until a purified gas can be delivered. The increases for the three towns will add $40,000 yearly to the gross and net earnings of the Dominion company.

Supplementary List.

Waterloo, Ont.—Water and Light Commission increased rate from $1.20 net to $1.40 net per M, April 1st, 1917.

Winnipeg, Man. — Winnipeg Elec-Ry. Co. cuts discount for prompt payment from 20 per cent. to 10 per cent.

Washington, N. C.—Washington Gas Co. increases rate from $1.35 per M to $1.50 per M.

Waukesha, Wis.—Waukesha Gas & Electric Co., has asked for a revised schedule of rates which has been filed with the Railroad Rate Commission at Madison. The schedule calls for a horizontal increase of 15 cents per 1,000 cu. ft.

Pittsburgh, Pa.—An increase in the minimum gas rate for maximum quantities from 17 cents to 24 cents 1,000 cu. ft. has been announced to the Pittsburgh city department of supplies by the officials of the Allegheny Heating Company.

Erie, Pa.—The Pennsylvania Gas Company has increased the city rate for natural gas 13 cents per 1,000 cu. ft.

Massachusetts.—The Plymouth County Gas, Heat, Light & Power Co. in the towns of Braintree, Rockland, Abington, Whitman and other places, raised their price July 1 from $1.35 to $1.50 per 1,000 cu. ft., with discount as at present if bills are paid within 15 days.

Illinois.—The Belleville Gas Co., supplying natural gas has applied for a rate of 85 cents per 1,000 cu. ft. before the public utilities commission.

A Correction.

On page 42 of THE GAS RECORD for July 25th there is a note on the "Heating of Buildings With the Rector System on the Pacific Coast." The inference from the reading of this article is that the radiators used for the installations named are made by the General Fire Extinguisher Co. This company has no rights on the Pacific Coast, the territory being controlled by the Rector System Gas Heating Co., Inc., or the Pacific Gas & Electric Co., and the credit of making the installations and supplying the material therefore should go to this company and not to the General Fire Extinguisher Co.

Gross earnings of the Pacific Gas & Electric Co. for June are reported to have shown an increase of $163,593. In the twelve months ended June 30th, gross earnings decreased $453,632. Net after taxes decreased $248,346.

To Give Us Their Experience

British Gas Industry, Thru the Association, to Tell American Gas Industry How It Has Met and Solved Problems Arising from War Conditions

In response to request of THE GAS RECORD, made in a formal letter April 12th to a dozen or more leading interests in the British gas industry, including the British Commercial Gas Association, the gas industry of America has been promised and will very shortly receive a valuable memorandum from the British Association. This paper will cover the work done by the British association during the war "in co-operation with other organized bodies within the industry," and also will tell how the association "has co-ordinated its activity with that of other agencies not only in industrial matters, but also in the various food and other public service campaigns."

In other words, the American gas industry is to be informed of the war activities of the British gas industry, in order that we may have the benefit of the experience of those who have gone through three years of war activity. This action on the part of our British cousins may be likened to that of England's War Office when the United States entered the war, and the whole experience of the Allies was given America as a lesson and guide.

The July "Bulletin" of the British Commercial Gas Association republishes in its article on this subject THE GAS RECORD's request for this information. It says:

"The following letter has been received from the editor of THE GAS RECORD of the U. S. A. regarding the work of the association in connection with war problems, etc.:

Gas Record's Request.

"The American gas industry, through its individual units, is eager to serve the United States of America to the limit of its capacities in the war with Germany.

"'As one of the units in the British gas industry, can you not send us at your earliest convenience, for publication in THE GAS RECORD, an article describing how your department of the British industry is serving your country, so that the corresponding department in the United States may have the benefit of your experience in national service?

"'By complying with this request you will undoubtedly be rendering a service to Britain and her Allies, since your article will enable the American gas interests to serve their country better, and may materially advance the manufacture of war munitions to be used against the common enemy.

"'We will be pleased to receive photographs showing gas equipment in factories, plans and other places where the war has made the 'speeding up' of production necessary.

"'If you have any knowledge of other gas service outside of that performed by your immediate department, please include it in your article, as we wish to give the American gas industry all the information obtainable in relation to the service the British gas industry is performing.

"'Thanking you in advance for this labor, in the name of the American gas industry, I beg to be,

"'Yours most sincerely,

"'THE GAS RECORD.

"'(Signed) Milt Saul, editor.'

Paper Being Prepared.

"As stated in the editorial article, a memorandum describing the work done by the B. C. G. A. in co-operation with the other organizations of the gas industry is being prepared, and will be forwarded to Mr. Louis Stotz, the secretary of the National Commercial Gas Association of America, in order to help, through the experience of their fellow-workers in England, our American gas colleagues in their efforts to assist the President of the United States in the prosecution of the war. A copy will be forwarded to the editor of THE GAS RECORD as a basis for the article which he desires to publish. In due course this memorandum will be presented to the members of the B. C. G. A. as part of the Annual Report for this, the third year of the war."

The Association's War Work.

Under the caption "The Association's War Work," the "Bulletin" goes on to say:

"At the last general meeting the request of America for information as to what the gas industry had done to assist the government in the making of munitions of war was reported. Members were informed that the association had already anticipated this desire, and had in preparation some notes which might be of service to the National Gas Association of America. Since receiving the definite request of the latter, however, it has been thought well to widen the scope of the memorandum so that it may cover the war work done by the association in co-operation with the other organized bodies within the industry, and to place on record, both for the benefit of our own members and to save the time of our American colleagues, how the association has co-ordinated its activity with that of other agencies not only in industrial matters but also in the various food and other public service campaigns.

"In order that this record may be of practical use to our American cousins, it has been decided to add by way of appendices (a) typical letters to those within the industry and those outside—both government departments and the general public; (b) specimen advertisements and drawings; (c) specimen articles, etc.

Useful in England, Too.

"The suggestion was made by one of the members of the General Committee that it would be useful if this memorandum in its complete form could be placed fairly soon at the disposal of the members of the association. This course will be followed, for it is felt that gas managers and others will find such a record of service useful when discussing with their boards or committees the value to the industry of the association's exercise of imagination and foresight in the early weeks of the war, when the executives with one accord switched off their energies from peace time propaganda to definite war service campaigns. Those campaigns have not only helped the country in its hour of stress, but will also, as their originators believe, bear richer fruit after the war than the industry would have harvested if, on the one hand, the association's activities had been drastically curtailed and money thereby saved, or, on the other, a policy suitable to peace but not necessarily suitable to war had been followed in an unimaginative and routine manner.

"The memorandum in question will soon be ready in a preliminary form, and in its final shape will constitute part of the Association's Annual Report. If members have in their own particular sphere or district done special work not initiated by or known to the association, the Secretary will be glad to receive particulars for incorporation in the memorandum.

"M. A. C. B."

It is needless to add that the entire American gas industry will await this valuable memorandum with eager interest.

SELLING GAS

Fay Grow Says—

But You Should Read All He Says At Hotel Men's Recent Convention

Fay Grow, western sales manager for the Michigan Stove Co., addressed the Mid-West Hotel Men's Association at Minneapolis, July 13th, and his remarks included some decidedly new and striking arguments in favor of gas equipment for hotel kitchens. Mr. Grow had the hotel men corralled, as it were, and since it was by their invitation he addressed them, they listened with extraordinary interest to his logical reasons for gas hotel installations. He said:

"At first blush when we broach this subject with many hotel men they are disinclined to warm up to the subject. Yet who, among you, should not look with enthusiasm and interest upon any proposition that contains advantages and economies that may be effected in the operation of your houses? It is needless for us to dwell upon the conditions of the solid fuel market with which you are all familiar. However, this situation is causing the big men in the business to look with favor upon any proposition of extraordinary merit that can be utilized to relieve this difficulty. All realize the convenience and cleanliness of gas, and you will concede gas has all the advantages of coal, minus the disadvantages; but, due to lack of convincing data bearing upon the advantages and economies that might be effected in your house, there would be naturally some hesitation upon your part to change fuel.

"Gas as a fuel for cooking in hotels, cafes and institutions today is far beyond the experimental stage, and we are in a position to quote from the experience of hundreds from coast to coast. Of course, there are some who have had sad experiences, due absolutely to one cause, and that is the inefficiency of the appliance or medium through which the gas was used—or better still, wasted. Today we number among the satisfied gas users some of the largest hotels and cafes in the world. The Waldorf, McAlpin, Knickerbocker, Rectors, Cafe Savarin and hundreds of others in New York City. The Statler hotels and Palace in San Francisco. The St. Paul hotel, Blackhawk, Leland, Jefferson, Martin, Woodruff Inn in Joliet. Many of these, including the St. Paul, the Leland and Woodruff Inn are operating for less

Fay Grow.

money, fuel for fuel, with gas than they were able to do with coal.

New Plan Devised.

"One of the questions that seems to be most prominent is: To what extent will the cook avail himself of the economy that is possible? To which we have suggested and inaugurated a plan of supervision in the use of gas by recommending a chart or form, having meter readings taken at the close of each day, and these reports placed on the manager and chef's desks the following morning. This plan of supervision has effected very satisfactory results. Close observation and data compiled from various sections show an average cost of gas per person served; seven and a half feet per person per meal, European plan; five feet per person per meal, American plan; three feet per person per meal for hospitals and institutions. These are very conservative figures that are given to enable you to get some idea of about how much gas it takes per meal per person with the most efficient appliance available today.

"Looking at this subject from another angle, at your last meeting in Omaha you had a paper by Mr. Letton on 'Advertising,' and a talk by Mr. Tolles on 'The Science of Business Building.' Now here it is possible to combine, to a large degree, the fundamentals of both. 'He who serves best profits most,' is a maxim that you all agree applies to the hotel business. You all realize that speed and service are two all-important factors in the successful operation of any hotel or cafe. For illustration, refer to Mr. Letton's paper crediting E. M. Statler as the largest hotel advertiser in the United States, and the late George Boldt of the Waldorf as having never paid for any direct advertising. Now both of these, after carefully analyzing all phrases and features of the utilization of gas, replaced with gas their complete coal equipments which were in first-class condition. In fact, the Detroit Statler was only seven months old. These changes were made with but one idea in mind: service, better cooking results and more speed.

Years of Experiments.

"It has taken years of experimental work to perfect a range that will perform all its functions well, supplying the chef with the proper heat for every kind of cooking, simplify his work, and improve cuisine, keeping in mind that this must be done at a cost the owner was willing to pay for. One of the biggest factors to consider was the human element, or operators of the appliance. These principles resolved themselves into two classes, application of heat and medium of control, from which developed the all-hot solid top range with the two red-hot spots on the front of each section and with graduating degree of temperature from front to back. One-half of the top of each section of range can be operated independently of the other, the top burners being arranged on a manifold in clusters of four, controlled by one lever, enabling the chef, by a simple turn of the wrist, in other words the least expense of energy, to regulate

his heated surface according to his requirements.

"A great many hotel men seem to be of the opinion that the only method of broiling is by the use of charcoal, but by consistent efforts the gas broiler has finally came into its own through its very successful operating features. via uniform application of heat. Grids mounted on adjustable bars, eliminating the bother of manipulating heavy and hot grids by hands, which, of course, was a time and energy saver and a great convenience, enable the cook to keep the broil at a perferred position and at any desired distance from the fire, and to be able to turn the broil with the greatest convenience. The elimination of smoke and smell from grease dripping and the saving in grease today is an item of consideration.

Some of Its Advantages.

"In conclusion I request your careful consideration of some of the advantages which I am confident will result from the utilization of gas for cooking purposes:

"Due to the simplicity and durability of construction of the modern gas range, cost of repairs and renewals is practically eliminated.

"More cleanly and sanitary conditions, hence greater efficiency.

"Fire not dependent upon drafts nor affected by weather conditions.

"Industrial rates prevail in some cities, and automatic reductions are allowed as your requirements increase.

"Eight per cent. saving in roast shrinkage.

"Entirely eliminating the necessity of providing space for the storage or cartage of fuel or for the removal of ashes.

"A constant supply of fuel is available night and day and the payment therefore is not required nor necessary until about 30 days after use.

"Greater opportunity for the exercise of economy in fuel expense, due to absolute control at the burner of the fuel supply and temperatures required.

"Instant concentration of heat is possible at the exact time, when and where heat is required, thus eliminating almost entirely the production of superfluous heat.

"Ease and accuracy with which comparisons and analysis of expense can be made per meal or per dollar of revenue.

"Finally, gas as a fuel represents the highest degree of safety, cleanliness and convenience and frugality to be found in any modern domestic fuel."

Heating Houses

Central Unit Warm Air Furnaces for Gas and Coal—Eliminate Waste

By F. R. Hutchinson

There are three ways of employing gas, two of coal, through warm air furnaces located in the basements of homes from which pipes lead to and distribute heat through registers to upstairs rooms. Manufactured or natural gas may be used through gas burners installed in coal warm air furnaces, through gas designed warm air furnaces or through warm air furnaces in which either or both gas and coal may be separately or jointly employed. Coal may be used in coal or combination gas and coal warm air furnaces. Average prevailing rates of the three fuels when employed for heating houses with warm air shows manufactured gas is highest in cost, coal next and natural gas lowest.

Coal designed warm air furnaces necessarily contain short fire travel in order to provide sufficient drafts to keep coal fire burning, and an extremely large proportion of the heat escapes up the chimney. When gas burners are installed in any coal designed warm air furnace, because of this short fire travel, a very considerable portion of the heat is lost through flue and cost excessive. It is simply out of the question to attempt to heat homes with manufactured gas through burners in coal furnaces—the cost is prohibitive. Even with natural gas at as low as thirty cents per thousand, cost equals or exceeds coal at from $6 to $7 per ton.

It is entirely practical to heat homes with either artificial or natural gas through efficient gas designed warm air furnaces. Manufactured gas must be sold at a very low rate however if all winter heat is desired. Thirty-five-cent artificial gas about equals coal at $10 per ton. Natural gas used through gas designed warm air furnaces at forty cents per thousand can be used at ratio of coal at about $5 per ton.

Comparison of Two Methods.

The advantages and disadvantages of these two methods of burning gas follow: Burners in coal furnaces, manufactured gas, advantage none, disadvantage, prohibitive cost. Burners in coal furnaces, natural gas, advantages, low cost of installation, comparatively low operating cost; disadvantage, difficulty of removal of burners during interruptions in supply. Gas designed furnaces, manufactured gas, advantage, freedom from dirt, trouble and labor; disadvantage, high operating cost in comparison with coal for all winter heating where rate for gas exceeds thirty-five cents per thousand. Gas designed furnaces, natural gas, advantage, freedom from dirt, trouble and labor, low operating cost; disadvantage, where employed as a direct or independent furnace, danger of a cold house during possible interruptions in gas supply.

Coal was very high in price, prompt deliveries rather uncertain last winter, this suggested the utilization of gas for fuel. Consumers could hardly afford, and gas companies, for the most part, did not solicit, the use of artificial gas for all winter heating. Additions to peak load mean additions to plant, mains, etc. Where natural gas is sold, so many householders turned to gas for heat, demand so exceeded production and pipe line capacity, service was interrupted and supply inadequate.

An analysis of the whole situation prompted the design and construction of a warm air furnace that would, without change, efficiently burn gas and coal separately or together. A survey of those appliances marketed disclosed the fact that there were numbers of, so-called, combination furances manufactured and sold, chiefly in the natural gas territory, entirely suitable for the burning of coal, but wastefully extravagant when gas was employed for fuel. They are designed primarily as a coal, secondarily as a gas furnace. The ideal house heating load for a company distributing artificial gas is spring and fall. To induce such heating, rate should be made low enough to not exceed by 25 per cent. coal cost at these seasons of the year, which would automatically prohibit, because of excessive cost, mid-winter use of gas.

Shortage of Gas.

Some companies distributing natural gas suffered but little with interruptions in supply, but majority had from three to ten days of shortage. In Cleveland there are, normally, about 200 heating days in the year. Even with ten days insufficient supply of natural gas, this represents but 5 per cent. of total heating period. Natural gas could, and probably would, be used for fuel 95 per cent. of the time, coal 5 per cent. if, without change user could turn from

one fuel to the other. It was concluded, therefore, following survey, that a furnace should be built primarily as gas, secondarily as coal. Such a furnace will be found useful to companies manufacturing and selling artificial gas for spring and fall heating and to natural gas companies to care for periods of interruptions in supply.

Illustrations following picture and copy describes the construction of the new patented high efficiency dual fuel gas-coal warm air house heating furnace, built to care for this rather complex fuel situation.

You will observe it is provided in

Fig. 1.

front with coal and gas fire doors, at side with ash pit door and in rear with two flue outlets, one each for coal and gas. The casing contains two units, an economical gas furnace, an efficient coal furnace of equal capacity. Gas, or coal or coke can be burned separately or together.

Within the same casing there are separate fire pots, radiators and flue outlets for coal and for gas, one having no connection with the other, and each unit of carefully designed construction for the most efficient use of the two fuels.

The coal furnace is of standard construction and suitable for the use of hard or soft coal, coke or wood. It may also be used as a rubbish burner. The triangular bar grate may be removed through the ash pit door opening. The fire pot is of heavy cast iron, made in sections, and, in case renewal is required after years of service, replacement may be made through the fire door. The radiator is of heavy steel plate and all parts have been carefully designed to give strength, efficiency and ease in operation. Openings are provided in fire door for the insertion in the fire pot of a coil for heating water, for bath and other domestic purposes.

Fig. 2.

The gas furnace is entirely separate from the coal furnace and, when in-

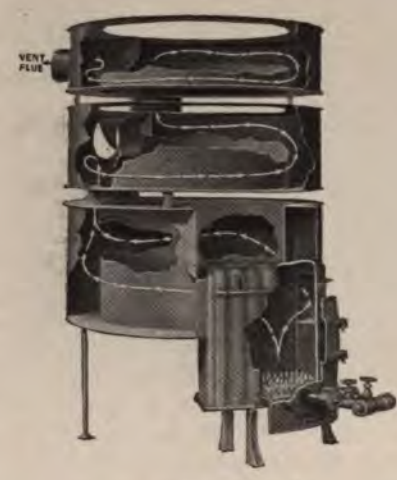

Fig. 3.

stalled, it surrounds the coal furnace as indicated in illustration Fig. 4.

Gas and Coal Furnaces Without Casing.

The gas furnace has a corrugated cast iron burner pot, to assure durability, the burner pot surrounding two powerful cast iron drilled burners. From the burners, the products of combustion pass through the burner pot and into the three radiators above it, encircling each radiator on their way to the vent flue. In this manner the long fire travel which is so necessary to secure "high efficiency" in the use of gas is secured. The radiators are made of heavy rust resisting iron, each joint and seam tightly made to prevent any possibility of the escape of burned gases into the warm air chamber. There is hardly a question that can be propounded by any propective user of warm air heat this furnace does not anticipate. It so completely meets every need, the demand for it will undoubtedly be very great.

The opportunity is present for these companies not previously exploiting gas for central unit heating, coal prices high, deliveries poor, to investigate this new furnace further and make some trial installations during the coming fall and winter to secure some definite data for a later strenuous campaign.

Fig. 4.

Big Industrial Gas Contract Closed at Rutland, Vt.

A contract has been closed with the Rutland Railway, Light & Power Co., by the Rutland Railroad Commission to supply gas in their shops for tempering, paint burning, tire heating and other industrial operations. This contract will develop into one of the company's largest industrial customers. Connection has also been furnished for a 1½-horsepower steam boiler for the York Shirt Co.

Public Service Hearing Is Concluded.

At the final hearing July 26th before the public utility commission of New Jersey on the application of the Public Service Gas Co. and numerous South Jersey gas companies for permission to reduce the standard of their product now being served consumers of the state opposing counsel became involved in a dispute as to whether the application was or was not really one involving the fixing of rates. The utility board took the application under advisement and reserved decision. The gas companies are asking for the lowering of the standard on the ground that the cost of materials used in the manufacture of their product has been greatly advanced.

A DANVILLE TRIUMPH.

Thirty-Two Homes Modernized with Ruud Heaters in One Week.

With the assistance of Carl Singer and his salesmen from the Ruud Manufacturing Co., the Danville (Ill.) Street Railway & Light Co. was able to modernize 32 modern homes in one week recently.

Crew of Salesmen Who Achieved Triumph at Danville.

Sales Manager V. W. Kennedy tells about it:

"During the week of July 7th to 14th we held our water heater week. We sold 2 No. 6, 8 No. 4, 6 No. 3 and 16 No. 2½ heaters. We used the advertising campaign outlined by the Ruud company, and in addition sent out circular letters. We are very much pleased with the results obtained during our sale. The argument our salesmen used was that a home was not modern until it had modern hot water service, and the only way to obtain modern hot water service was by installing a Ruud automatic water heater.

The accompanying photograph of the crew that made 32 families happy in Danville shows, reading left to right, V. W. Kennedy, sales manager; W. F. Stuebe, J. Parnell, H. D. Clifford, Carl Singer, A. Simler and "Happy" Ward. It will be noticed that Carl Singer, the popular salesman of the Ruud company, still holds his cigar in the same "we did it" angle.

Canning Campaign Getting Much Publicity.

The campaign which is being run by the new business department of the Doherty Organization to get the people of the country interested in canning and preserving, is now well under way. Following the ideas outlined in the plan of the National Commercial Gas Association the Doherty companies have done much to further this patriotic scheme and help the country and at the same time increase the consumption of gas.

Methods of interesting women in the canning project varied all the way from patriotic posters and cartoons in the newspapers, to formal recipes on how to can peas and preserve peaches. So many clippings showing how the campaign has progressed, have been received at the New York office, that it is impossible to tell what each gas property did to help in the work.

Submarine Window Is Ragan's Latest Stunt.

The accompanying picture is a reproduction of a photograph taken of the latest Humphrey water heater window, arranged by L. E. Ragan, of the Rome (N. Y.) Gas, Electric Light and Power Co. The body of the submarine is made of a No. 30 Humphrey automatic water heater, the top part of a 5-I tank heater, the periscope is represented by a part of an old sign projector and an 8-inch electric fan makes up the propeller. The ocean scene was painted by a Rome scene painter.

Ragan's Submarine Window.

HEATING HOUSES.

Some Speed at Staunton, Ill.—21 Water Heaters Sold in 90 Days.

R. G. Hayler has succeeded W. R. Robinson as superintendent of the St. Clair County Gas & Electric Co., at Staunton, Ill., the latter having been transferred to Elkhart, Ind. Staunton, which is operated out of East St. Louis, is a very live little town of about 7,000 inhabitants and although it has only had gas about 90 days, the gas company has sold 21 Ruud automatic water heaters—some record for a small new gas town. Mr. Hayler shares these honors with "Knock-'Em-Dizzy" Ward of the Ruud Co., who left after a campaign of one week.

The automatic water heater department of the Consolidated Gas Electric Light & Power Co., of Baltimore, under the direction of William H. Matlack, Jr.., is effectively bringing to the attention of the public of that city the convenience and economy of perfect hot water service. Every prospect for this gas appliance is being thoroughly cultivated.

OPINIONS AND COMMENTS

THE RATE MOVEMENT.

The readiness with which a majority of the state commissions and city authorities are grasping the situation in regard to manufacturing gas today is one of the most gratifying experiences that gas companies have encountered in recent years. It is true that in some instances where necessity has driven the public service company to plead for adequate rates or a reduction of standard requirements in the quality of gas, there have been hostile attacks from outside sources, but in the main the movement for relief has been met with due consideration and from all parts of the country reports of successful petition have been received. See the list published in this issue.

The Indiana Gas Association, in its petition to the public service commission for a reduction from 600 B. t. u. to 550 B. t. u., sums up the situation of gas companies very graphically. The petition says:

"In the operation of a coal gas plant it is not possible to produce gas having an average heat value of 600 B. t. u. except by imperfect and therefore wasteful carbonization of the coal. While incomplete carbonization is at all times objectionable, it is especially important at this time when supplies of coal are obtained with difficulty to utilize them in the most efficient manner possible. This cannot be done if a standard of 600 B. t. u. is maintained. On the other hand, if the coal is perfectly carbonized, and a normal product of the same is enriched to bring it up to the standard established by this state, this can be done only by wasteful use of benzol or other valuable and expensive enriching oils, which are likewise exceedingly scarce at this time. It is possible that the Federal Government will forbid such use of these important oils in any event, but if they are used by the gas companies, the waste of the nation's resources is out of all proportion to any benefit derived therefrom by the consumers of gas.

"In the operation of water gas plants the maintenance of the present high standard of heat value must involve a wasteful use of petroleum oils. The difficulty of obtaining gas oil at any cost is so great and the transportation thereof is so irregular, that many gas companies have been forced to reduce the heat value of water gas simply in order to make their supplies of oil last over until others can be obtained. The conservation of the nation's supplies of fuel oil requires as serious consideration as the conservation of its supplies of coal, and it is the belief of your petitioners that the maintenance of the present standard of heat value for gas will involve an unwarranted waste of such supplies, even if the gas companies can always obtain the quantities of oil which they require."

"I have had some experience as a salesman, and I have found that it is a great deal easier to sell a big thing than to sell a little thing. It was easier to sell the Carnegie Steel Corp. to Mr. Morgan for $500,000,000 than it would be to sell a $100 piano to a farmer who was not interested in music."—Charles M. Schwab in Printers Ink.

The GAS RECORD

MONADNOCK BLOCK, CHICAGO, U. S. A.

W. H. Graffis . . . . . *President*
H. D. Fargo . . . . . *Vice-President*
H. B. McMeal . . . . . *Secretary*
Herbert Graffis . *Treas. and Adv. Manager*
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Walter V. Turner . . . *Technical Editor*

SUBSCRIPTIONS

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ADVERTISING

THE GAS RECORD is issued the 2nd and 4th Wednesdays of each month. Copy can be accepted as late as the Monday previous to each issue. Where proof must be seen, allow ample time for transmission in the mails.

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Eighth Page, per issue	7.00	8.00	9.00	10.00
Sixteenth Page, per issue	4.00	4.50	5.00	6.00

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A PATRIOTIC DUTY.

That the problem of supplying toluol to meet the government's requirements for trinitrotoluol used in the manufacture of high explosives is becoming serious, is reflected in the weekly market reports. Companies producing toluol, in most cases, have disposed of their entire output to March 1, 1918, while many contracts are for delivery as late as the fall of next year. The present annual production of approximately 10,000,000 gallons of toluol is wholly inadequate to meet the requirements of this great war.

Picric acid derived from benzol has been suggested as a substitute. While this is practical in the manufacture of certain munitions, trinitrotoluol is far superior for most high explosives.

It is evident then, if this war is to be successfully prosecuted, that additional toluol must be furnished to the government. Therein lies the opportunity for the gas industry to come to the front and supply this much needed product. A misapprehension seems to exist among many that toluol and benzol are by-products of coal carbonization only. This is not the case. Mr. Gartley, in a recent discussion, pointed out that a 20-candlepower water gas carried more toluol than a like quantity of 16-candlepower coal gas. As the number of water gas plants in the United States outnumber the coal gas plants, water gas manufacture offers a large and ready source of supply for toluol.

Companies operating under high candle power standards should be given immediate relief by their respective city councils or state commissions. Our country's demands must take precedence over all others. The extremely low percentage of gas consumers who still use the flat flame burner for lighting will be the only ones affected. The substitution of modern mantle lights in such cases not only will give them better illumination but such service will be obtained at less cost.

It is the patriotic duty of every gas company, where conditions permit, to install recovery plants to meet this urgent need.

Chicago Reduces Rates

Elimination of Candle Power Standard Will Save More Oil Than Used by the United States Navy in 1916—Agreement Between City and Utility

By C. T. Chenery

Sanderson & Porter, Chicago

The city council of Chicago has passed an ordinance permitting the Peoples Gas Light & Coke Co., of that city, to change its rates and standards. This ordinance is the result of a long negotiation between the representatives of the city and the company. As passed, it takes the form of an agreed contract for a period of one year which may be in force for a total period of five years if both parties so desire. This action by the city council has large significance. It marks the end of a historic fight which has progressed for a generation, and is a striking example of the realization of the mutuality of interest of cities and of the companies which furnish necessities to them.

The gas company has been the football of the political parties of Chicago. Twenty-five years ago the chartering of new and competing gas companies was a favorite occupation of the city council, and of "enterprisers" who saw a rich harvest that might be reaped by forcing the old company to maintain its monopoly by the purchase of such new companies as might be able to secure franchises from the city council. In recent years this hostility between the city and the company has manifested itself in a mayoralty campaign with "70-cent gas" as a slogan, a series of rate regulating ordinances which the company never accepted, and of a suit for a refund for money collected by the company in excess of the return from the rate fixed by ordinance for the five-year period which ended August 11, 1916. This excess is alleged by the city to total about $10,000,000, and the suit is still pending, although negotiations were begun some several months ago to work out an adjustment. The company offered to refund $3,300,000 of this alleged overcharge in order to settle the suit, stating that their offer was made entirely as a concession to public opinion.

Physical Aspects of Case.

There are several interesting features of this ordinance, not the least of which are the methods of working it out, and the broad, economic reason for its acceptance by both the city and the company. To understand the difficulties in the way, it is necessary to review the physical aspects of the case. The company manufactures water gas exclusively, although it purchases almost a quarter of its product, and this purchased gas consists largely of coke oven gas which is manufactured by a local company, and of natural gas which is brought in from the Indiana fields. The company's sales are approximately 21,000,000,000 cubic feet per year, and there are about 700,000 consumers on the company's books, which makes the average monthly use about 2,500 feet per consumer. There are over 3,000 miles of distribution mains, nine manufacturing stations (all of which are not in continuous use) and holders with a storage capacity of 68,000,000 cubic feet.

Gas Users Take Notice!

The Peoples Gas Light & Coke Company hereby offers to give two (2) Junior mantle lights to each and every consumer of gas in the City of Chicago who is wholly dependent upon flat flame burners for illumination, and to install them free of charge.

Please read carefully the instructions given below for taking advantage of this offer and promptly securing—

FREE—Two Junior Mantle Gas Lights

At the right hand side of the first gas bill you receive on and after August 10, 1917, you will find a coupon headed, "To The Peoples Gas Light & Coke Co."

If you have no incandescent mantle gas lights or electric lights in your home, *sign that coupon* on the line marked X.

Do not tear off the coupon; just sign it and it will come to us, when you pay your gas bill, as your application for the two Junior mantle lights. We will then furnish and install the lights FREE—*provided*, as specified by City Ordinance, you are wholly dependent upon flat flame burners for illumination.

The Peoples Gas Light & Coke Company

Ad in Chicago Daily Papers.

The old ordinance required that gas should have a lighting value of 22 candlepower, and a heating value of 600 B. t. u., but in order to conform to the candlepower requirement, the company has been furnishing gas with between 660 and 670 B. t. u., and has been charging a flat rate of 80 cents per 1,000 cubic feet. To provide gas of these standards, the company has been making water gas and enriching it with gas oil. This requires about 80,000,000 gallons of gas oil per year (which is slightly in excess of the United States Navy's 1916 oil consumption), and as the oil fields of the country are much past their maximum of productivity, and as the price of gas oil has more than doubled in the last few years, the company desired to eliminate the candlepower requirement entirely and furnish gas on a heat unit standard of 565 B. t. u., which would permit of the substitution of by-product oven gas, or coal gas, instead of the present water gas, and thereby eliminate this use of oil. The whole negotiation was based on this change of standard, and of the fixing of a new rate for the new gas.

The task was a peculiarly complicated one, for while the company was and is charging 80 cents per 1,000 feet for gas under a court order, yet the rate fixed by the city under an ordinance suggested by Dr. Bemis in 1911 was 68 cents. It was necessary to reconcile these divergent views and find some rate acceptable to both the city council and the company as a base for comparing the usefulness of the proposed gas with the present gas, and thereby determine a new price for gas of the new standards. The problem was further complicated by the insistence of the company on the fixing of standards which would abandon the candlepower requirement and thereby finally eliminate the use of oil in gas manufacture, for the city took the position that practically 100,000 families were dependent upon open flame gas burners for their household lighting, and therefore that the abandonment of the candlepower requirement would force these people to the use of mantles at considerable inconvenience and expense to them.

These difficulties were finally met by both the company and the city making valuable concessions. These will be discussed in the following order: Rates, standards, mantle lights, new manufacturing plant, profit sharing, city investigation and control.

The rates finally agreed upon have an unusual dress. It was suggested

by the representatives of the city and agreed to by the company that for purposes of expediency, consumers with small meters, that is, 3, 5 and 10 light, should be regarded as domestic consumers, and customers with larger meters should be treated as industrial consumers, a simplification which an examination of the company's records appeared to justify. For these domestic consumers, so described, the rates are as follows:

	Cents Net
For the first 350 cu. ft. or less	30
From 350 cu. ft. to 10,000 cu. ft.	70
From 10,000 cu. ft. to 50,000 cu. ft.	65
All over 50,000 cu. ft.	40

This charge of 30 cents for the first 350 cubic feet or less acts both as a service charge and as a minimum bill. If a consumer uses no gas he pays 30 cents a month; if he uses 1,000 cubic feet, his bill is as follows:

	Cents
350 cu. ft.	30
650 cu. ft., at 70 cents per M	45.5
Cost for first M	75.5

This 30-cent charge for the first 350 cubic feet makes the rates for domestic users a sliding scale as follows:

	Cents Per M.
1,000 cu. ft. monthly consumption	75.5
2,000 cu. ft. monthly consumption	72.7
2,500 cu. ft. monthly consumption	72.2
3,000 cu. ft. monthly consumption	71.8
4,000 cu. ft. monthly consumption	71.4
5,000 cu. ft. monthly consumption	71.1
10,000 cu. ft. monthly consumption	70.5
15,000 cu. ft. monthly consumption	68.6
20,000 cu. ft. monthly consumption	67.8
30,000 cu. ft. monthly consumption	66.8

This rate is not entirely satisfactory to either the city or the company, but meets the ideas of both more nearly than any other which the conferees could devise. The company's objection is that the top rate of 75 cents per M is too low; that the rate stays up too long to encourage consumption on the part of the smaller user, that is, that there should be some sharp drop in the rate after the 3,000 or 4,000 consumption point, and finally that the minimum bill of 30 cents per M is too low.

The city objected on the ground that there had never been a minimum bill for gas in Chicago and the committee had no desire to creat a precedent. They further objected on the ground that the top rate was too high and should come down. Through the entire preliminary discussion of rates the question of what was the fair value of the company's property continually arose. As this question is the basis of the city's suit for a return of excess collected by the company, neither party desired to express an opinion on this point, and the rate finally agreed upon has an automatic adjuster in the form of a profit-sharing agreement between the company and its consumers that creates a mutuality of interest and may make a decision as to the value of the property unnecessary.

The wholesale rates are practically the same as the domestic ones, except that each particular size of meter takes its own rate for the 350 cubic feet of gas used, and its own minimum bill. The charges for the first 350 cubic feet to wholesale consumers are graduated from 40 cents for the 20-light meter to $2 for the 400-light meters, and the minimum bills vary from 50 cents to $6 per month.

Size of Meter	Net Charge for First 350	Minimum Bill
20 light	$0.40	$0.50
30 light	0.50	1.00
45 light	0.60	1.25
60 light	0.70	1.50
100 light	0.90	2.00
150 light	1.15	2.50
200 light	1.35	3.00
250 light	1.50	4.00
300 light	1.75	5.00
400 light	2.00	6.00

The rate for consumption between 350 and 10,000 cubic feet is 70 cents; from 10,000 to 40,000 cubic feet the rate is 65 cents and for all in excess of 50,000 cubic feet, the rate is 40 cents.

For a 100-light meter the rates are as follows:

	Cents Per M.
10,000 cu. ft. monthly consumption	76.6
20,000 cu. ft. monthly consumption	70.8
50,000 cu. ft. monthly consumption	67.2
75,000 cu. ft. monthly consumption	58.2
100,000 cu. ft. monthly consumption	53.7
150,000 cu. ft. monthly consumption	49.1
200,000 cu. ft. monthly consumption	46.8
300,000 cu. ft. monthly consumption	44.6

Wholesale users, like domestic ones, must start at the top of the scale and work down through the successive steps. The heavier service charges on wholesale users were insisted on by the city's representatives who wanted to prevent the large user from getting down to the 40-cent rate too quickly.

Standards.

The standard for gas is fixed at a monthly average heating value of 565 B. t. u., with a daily average for any two consecutive days of not less than 540 B. t. u. The candlepower requirement is as follows:

	Candlepower
For 60 days following the acceptance of the ordinance, not less than	16
For the next 120 days	12
For the next 12 months not less than	9
Nor more than	11

The last provision of "not less than 9 nor more than 11 candlepower" was insisted on by the city's representatives in order that the people might know through experience what low candlepower really meant, and be educated to the use of mantles before the candlepower requirement was eliminated.

This change of standard met with much opposition in the committee, and the opposition was heightened by a report of the Bureau of Standards of Washington, D. C., which held that the usefulness of the gas varied practically in proportion to its B. t. u. content.

There are, the city contends, something like 100,000 consumers of gas in the city who use only flat flame burners, and are therefore dependent upon the illuminating quality of the gas for light, and it was to protect and educate these consumers to the advantages of mantles that the candlepower requirement was continued in force for 18 months.

Mantle Lights.

Tied to the change in standards is the provision that the company shall make the necessary adjustments for all gas appliances in the city—four free adjustments are provided for the first year, and two for each year thereafter —and also the provision that the company shall furnish free to all consumers wholly dependent upon flat flame burners two Junior mantle lights. The company is required to make a house-to-house canvass within 60 days after the ordinance goes into effect, to offer and install these Junior mantle lights to people who have no other means of lighting than flat flame burners. The company is further required to furnish mantles at half cost to any and all consumers in the city who may desire them.

These mantle lights should have replaced the flat flame burners long ago. A flat flame burner will use five cubic feet of gas per hour and give 22 candlepower or less; a Junior mantle will use 2½ cubic feet per hour, and give 45 candlepower.

The fragility and short life of mantles was one of the chief objections to their substitution for flat flame burners, but even on an assumed life of 500 hours (which is one-half of their rated life), the comparison is all in their favor:

	Cubic Ft. Consumption
Flat flame burner, 5 cu. ft. per hour, 500 hours	2,500
Junior mantle light, 2½ cu. ft. per hour, 500 hours	1,250
Saving of mantle burner on 500 hour use	1,250

	Cents
1,250 cu. ft. at 75 cents per M	94
Cost of new mantle and mica chimney	10
Cash saving through mantle (exclusive of great increase in illumination)	84

New Plant.

The change of standard was based upon the demonstrated obsoleteness and expensiveness of water gas manufacture and of the wastefulness of using 80,000,000 gallons of oil annually to enrich this gas. The city therefore wrote a provision into the ordinance requiring the company, itself, to build a new coke oven gas plant within three years (refused to accept as a substitute the phrase "cause to be built") and to supply to its consumers within the city of Chicago not less than 8,000,000,000 cubic feet annually from this plant. It was felt by both parties that the construction of this plant would materially lower the cost of manufacturing gas, as the present cost of manufacturing water gas is in excess of 30 cents, and the company now is buying all the available by-product gas, and this gas will meet the new heat unit standard, at about 10 cents a thousand feet.

When coke oven gas is made, the gas itself is a by-product, coke being the principal product, and tar, gas and ammonia being other valuable products recovered. It is clear then that the cost of gas to a company which manufactures by-product gas will be dependent on the prices which it receives from the other by-products of its manufacture, namely, coke, tar and ammonia. As the building of a plant of the size required by the ordinance means the making of 500,000 tons of coke annually, and the finding of a market for this coke and for the other by-products which will be recovered, the cost to the company of this by-product gas will vary as the market prices of the coke, tar and ammonia and these prices cannot be accurately forecasted.

Profit Sharing.

This feature is one of the most striking in the new ordinance. It is a bold attempt to find a solution to some of the most difficult problems of public utility control by providing a mutuality of interest between consumers and stockholders in the sound and successful management and operation of a company's business. The profit sharing provision requires that all of the income of the company, whether from the sale of by-products or from the sale of gas or from any other source must be put into one common fund. From this fund there will be deducted: (1) Normal operating expenses, including depreciation and reserves; (2) taxes and special assessments; (3) an amount equal to 6 per cent. return on new securities which may be issued under lawful authority and which represent face value additions to the company's property.

After these payments have been made, there is a fund of $4,000,000 set aside to pay interest on the company's bonds, which amount to $2,387,000 and to pay a dividend on the stock of a little more than 4.2 per cent. After this fund of $4,000,000 has been set aside, the next $500,000 is divided 75 per cent. to the company and 25 per cent. to the consumers. All moneys in excess of this amount are divided equally between the consumers and the company. In other words, after the company has paid a dividend of 4.2 per cent., it divides its earnings on a basis of one-fourth to the consumers and three-fourths to its stockholders. After it pays 5.2 per cent. dividend, it will divide its earnings equally between its consumers and its stockholders. This arrangement acts as an automatic price adjuster; it gives to the company a low rate of return, that is, 4.2 per cent., before it starts to share its profits, and absolutely assures the users of gas that if the company is able to make large savings through the operation of the new coke oven plant or in any other manner, that the consumers will share equally with the stockholders in these profits.

Reduced Gas Rates Are Now in Effect!

All gas bills delivered in the City of Chicago on and after August 10, 1917, for gas used through any one meter, (10-light size or less) will be at the following rates:

30 cents per month minimum bill, including 360 cubic feet of gas.
70 cents per 1,000 for the next 9,650 cubic feet per month.
65 cents per 1,000 for the next 40,000 cubic feet per month.
40 cents per 1,000 for all gas in excess of 50,000 cubic feet per month.

Under these reduced rates, gas can be used *to advantage*, as a fuel, as well as a light producer, for practically all household, business and industrial purposes. Think what that means!

Gas Is Now the Economical Fuel of Fixed Price and Unfailing Supply

Coal is high and will be high indefinitely. With the government's war needs having first call upon overtaxed railroad transportation, sufficient supply of coal *at any price* is uncertain.

Gas furnishes concentrated heat under perfect control. Its price is fixed—does not fluctuate. Unfailing supply, always on tap, is assured.

Specially designed appliances, scientifically adjusted to each particular use of gas, whether for light or fuel, eliminate waste and make gas efficient as well as economical for the multitude of purposes suggested below.

For Apartments and Residences

Our show rooms contain extensive exhibits of appliances and our salesmen are prepared to give you full information on use of gas for any of the following purposes in the home:

Heating: Radiantfires, Gas Grates, Gas Logs, Steam Radiators (Individual), Hot Air Furnaces, Portable Room Heaters, Steam Heating Plants, Hot Water Heating Plants

Lighting: Floor Lamps, Table Lamps, Shower Lights, Side Brackets, Domes, Semi-Indirect, Water Heaters, Automatic Tanks

Kitchen: Ranges, Heaters, Garbage Incinerators, Stove Lighters, Toasters

Laundry: Washing Machines, Irons, Clothes Dryers, Laundry Stoves, Ironing Machines

For Business and Industry

Specially designed industrial gas appliances are shown in operation at our laboratories, 1229 South State Street. Hotel and restaurant appliances are at our main showroom, Adams Street and Michigan Avenue. Expert counsel is at your command on use of gas for the following purposes:

Manufacturing: Forging, Rivet Heating, Annealing, Case Hardening, Tool Hardening, Die Hardening, Soft Metal Melting, Brass Melting, Enameling, Japanning, Core Dryers, Saddle Drying, Brazing and Soldering, Vulcanizing, China Kilns, Glue Pots, Varnish Kettles, Cupola Lighting, Embossing

Steam Boiler Work: Drying, Jacket Kettle Work, Textile Work

Steam Boiler Work (Continued): Pressing, Scouring, Sterilizing, Plating Plants

Illumination: Gas Arcs, Store Lighting, Office Lighting, Factory Lighting, Shop Lighting, Window Lighting, Outside Lighting

Food Manufacturing: Boiling Cakdrons, Smoke Houses, Candy Furnaces, Sterilizers, Hog Singeing, Branding Irons, Pitching & Depitching, Coffee Roasting

Hotels and Restaurants: Cereal Boilers, Steam Tables, Bar Urns, Broilers, Bake Ovens, Bakers' Pyrex, Coke Griddles, Waffle Irons, Melting Butter, Carving Tables, Tea and Coffee Urns, Dish Washers, Egg Boilers, Salamanders, Hot Plates, Oyster Steamers, Ranges, Steam Boilers, Roasters, Toasters, Rice Bakers

Let us show you how to use gas to the best advantage for any of the above purposes. 'Phone, call or write.

The Peoples Gas Light & Coke Company
Peoples Gas Building — Telephone Wabash 6000

Recent Ad Used In Chicago.

City Investigation and Control.

The company has never recognized the right of the city to regulate its rates and service, and this position of the company has been strongly reinforced by a recent decision of the Illinois Supreme Court which definitely places the power of regulation of the public utilities in Chicago as well as throughout the state under the jurisdiction of the state public utilities commission.

In this ordinance, however, the company by contract gives the city the right to regulate both rates and standards and to have full access to all records and property of the company at any reasonable time in order that it may judge of the reasonableness of any rates then in effect or which may be proposed. This right to regulate which is conceded by the company to the city, is subject to the following conditions: (1) That the city shall not alter existing rates or standards for one year; (2) that the company does not waive the right to contest the imposition of any order of the city council on the basis of the unreasonableness of that order; (3) that the company is not bound to comply with any order of the city council which is in conflict with the regulations of the state public utilities commission.

These provisions are essential to the continuance of harmonious and friendly relations with the city council and were designed to meet the very difficult situation which might be precipitated in the event of a conflict between the desires of the city and of the state public utilities commission. It is a large concession to "home rule" sentiment of Chicago.

The ordinance was based on a broad, economic policy, and it does not, and in fairness could not, offer any large immediate pecuniary rewards to either the city or the company. The gas users will pay about the same monthly bill which they have been paying, and the company's earnings will not be largely affected one way or another until the new gas by-product gas plant is built. From then on both the city and the company will show a distinct dollars and cents gain.

COURTS-COMMISSIONS

Amortization, Leakage, Mixed Gas, Etc., Covered in Ohio Case.

In the case of the Ashtabula Gas Co., the Ohio commission says: 1. In arriving at a just and reasonable rate, it is essential that the commission should determine not only the value of the property, but also the operating expenses, the amount to be set aside for contingencies and for depreciation or amortization, and what rate of return should be allowed upon the investment; 2. The return of a natural gas utility should be high enough to amortize the plant, less its salvage value, during the life of the field from which it draws its supply; 3. A return of 10 per cent. was fixed as a fair rate upon the investment in a natural gas plant; 4. A natural gas utility making no provision to amortize the value of its plant during the early years of its operations should not be permitted to provide for the amortization of the entire plant, less salvage value, during the remainder of the period of the life of the field, especially where the rates during the early years were voluntary rates, since the utility cannot in justice ask future consumers to reimburse it for a failure to collect a sufficient amount from those whom it served in the past that was the result of its own oversight; 5. A natural gas utility maintaining an artificial gas plant for emergencies in case of failure of the supply of natural gas as required by municipal ordinance, should be allowed in the rate of return such a sum as will equal interest on the investment and depreciation on the buildings; 6. Rates for natural gas for several municipalities served from the same source of supply should be the same where all are at the termini of the various branches from the main line, although one consumes a greater proportion of gas and has a more expensive distributing plant and another is further from the source of supply; since it is to the advantage of each that the gas for all is transported through one main line because of the added volume and pressure, and, if each pays in proportion to the amount consumed, each bears its proper share of the whole transportation and distribution expense; 7. A minimum charge implies that it will be absorbed in the rate in case a certain amount of the commodity is used, while a readiness to serve charge may or may not be absorbed; 8. The readiness to serve charge of a natural gas utility was arrived at by dividing the investment in the distributing plant by the number of consumers and computing interest on that sum at 6 per cent.; 9. The allowance for leakage of natural gas through the distributing system was fixed at 16 per cent.

M. O. League Attacks New Chicago Ordinance.

The legality of the new Chicago gas ordinance which was passed by the city council on June 1st, will be attacked before the state public utilities commission by the Public Ownership League of Chicago. The formal objection to the ordinance was filed in Springfield by Fayette S. Munro, attorneys for the league.

The objection sets forth that the new ordinance is in conflict with the public utilities law, and that no agreement as to rates was ever reached between the city and the Peoples Gas Light & Coke Co.

Claims are made that the ordinance is discriminatory, and that the proposed change in rates is designed to compel the people of Chicago to buy electricity for lighting purposes, and gas for heating purposes.

Atlantic City Asks for 10-Cent Increase in Rate.

Mounting cost of production and the fact that no dividends have been paid since July 1, 1914, were the reasons assigned in a petition presented by the Atlantic City Gas Co. to the City Commission recently asking authorization to raise the price of gas from $1 to $1.10 per 1,000 feet in Atlantic City. In its petition today the Atlantic City Company said:

"This company cannot continue to comply with the regulations of the Board of Public Utility Commissioners on quality of gas and continue to give good service to its consumers, make extensions of mains and house connections, and keep progress with the growth of the community, unless it receives adequate revenue, and it is imperative that during the present period of high prices for gas-making materials and labor that an increase in the sale price of gas of at least ten cents per thousand cubic feet shall be allowed."

> ***The real end to be sought by regulation is adequate service for a reasonable charge. The fair return should follow the service and never precede it.* * * We know of no fact that will retard the growth and the development of a community to a greater extent or work a greater injury to the public therein than the lack of proper public utility service.* * * Capital naturally is timid and in the last analysis the investor must be satisfied that it is for his benefit to engage in the utility; otherwise he will not part with his money.—John S. Rilling of Pennsylvania Public Service Commission.***

Waterville, N. Y., Doesn't Deserve Gas, Commission Says.

The Waterville (N. Y.) Gas & Electric Co. will not be compelled to rebuild its gas plant which was destroyed by fire on Sept. 22, 1916. This ruling has been made by the commission at Albany and is based on the viewpoint that it would be unjust to compel a corporation or a branch of a corporation which for years has been doing business at a loss to go to the expense of rebuilding its plant. It is conceded that public service corporations at times are required to furnish service without adequate compensation, but in this instance, it is held that an order instructing the Waterville company to resume its gas business might mean that the consumers of electricity and steam would be required to assume the burden of making up for the losses due to the gas operation. The case was brought before the commission in a complaint made by the trustees of the village, which has but about 1,500 residents and has been diminishing in population for years. There are no industries. Prior to the fire there were about 90 consumers of gas for heat and light.

Liberal Return on Investment Encouraged in New York.

In the case of the Bronx Gas & Electric Co., the first district of the New York Public Service Commission rules: 1. In passing upon a request for the discontinuance of a proceeding instituted upon the commission's own motion, the commission may base its judgment as to the sufficiency of cause for continuing the proceeding upon either the evidence formally presented at the hearing, or the knowledge acquired by it from records in its files or investigation made by it; 2. An order made in response to a request to discontinue a proceeding to inquire into a rate does not amount to a finding as to whether the rate in question has been shown to be unreasonable; 3. Although the book value and the original cost of a utility's property are accepted as evidences of fair value upon which the utility is entitled to earn a return, they are not conclusive even if the book entries have followed the accounting methods prescribed by the commission; 4. The investment and operations in the different departments of a utility should be segregated in order to determine the reasonableness of the rates and the return to be allowed for the separate and indipendent services; 5. Greater weight should be given to the securities of a public utility issued under plenary regulation in fixing the fair value of the property for rate making, than that attached to securities issued in the absence of strict control of the amount and purpose; 6. The investment, as well as the value of the property, should be given some consideration in fixing the amount of return for a public utility whose outstanding capitalization has been issued under public regulation as to amount and purpose; 7. Comparisons of rates affords no criterion for determining the reasonableness, where the circumstances and conditions of operation are dissimilar; 8. A liberal return should be allowed a utility operating in a growing community, and having limited resources for new capital, to attract new investment required to finance extensions and for the enlargement of facilities to meet the community's requirements without the payment of large discounts.

ABOUT MEN YOU KNOW

B. T. Burt, the past two years vice-president and general manager of the Rutland (Vt.) Railway, Light & Power Co., now is assistant to the chief executive of the Mexican Light & Power Co., Mexico City, Mexico. He will assist in the management of the engineering and operating departments of the Mexican and subsidiary companies.

C. U. Peeling, local manager of the electric light and gas properties at Oshawa, Ont., has been appointed manager of the Cornwall Street Railway, Light & Power Co., and the Stormont Electric Light & Power Co., at Cornwall, Ont., succeeding William Hodge.

Officers and directors of the Commonwealth Edison Co., business associates, personal friends, relatives and the employes celebrated the 25th anniversary of Samuel Insull's presidency of the company and its predecessors at an "Edison family birthday party," at Chicago, June 25th.

W. L. Barker, electrical engineer of the Southern Utilities Co., consisting of electric, gas and ice properties in Florida, has resigned to accept the position of electrical engineer of the Manila (P. I.) Electric Railroad and Light Co.

FRED MUELLER'S CALF.

Buys "Red Cross King" and Red Cross Is $450 Better Off as a Result.

Out of a day of activity in Decatur, Ill., recently the Red Cross got $450 from Fred Mueller and Fred got a calf. It was a big day. It was also Calf Day, a celebration by the Decatur Calf Club. The particular calf that formed the chief attraction in the entire event might have been named Mary, but it would have been a misfit name, so they called it John. They auctioned John off to the highest bidder and Fred Mueller got him for the tidy sum named above. Plain John, however, didn't seem to Mr. Mueller quite the proper handle for a bull-calf with a $20,000 daddy and a pedigree as long as a walking stick, so he changed the name to "Red Cross King." Many of Mr. Mueller's friends in the gas industry know of his fine dairy, at Allen's Bend, in which there are a number of milch cows (spelling correct), from which the Mueller family get their daily supply of cream and butter. To this institution "Red Cross King" was sent, and there he will be kept until he grows up and gets sense enough to appreciate the favor that has been done him—the concrete floors, the metal stanchions, the sanitary conditions that prevail, and all the other little thoughtful things that only a kind man like Fred Mueller could think of. Not only that, but Mr. Mueller has had the Holstein-Friesian Cattle association erase the plain "John" from their blue book and substitute "Red Cross King" so that future generations of this blue-blooded strain may know and feel proud of their ancestor. Mrs. S. P. Stevens, of Chicago, presented the calf to the executive committee of the Decatur Calf Club, which was formed to encourage dairy cattle raising in that section, and it was this committee that auctioned him off to Mr. Mueller. The accompanying photograph shows what a magnificent gentleman-cow "Red Cross King" is going to grow up to be. It also shows the proud look of ownership Mr. Mueller feels every time he shows the calf.

Fred Mueller and His Calf, "Red Cross King."

Thomas Allen has resigned his position with the Newport News (Va.) and Hampton Ry., Gas & Electric Co. to engage in business on his own account.

E. D. Brewer, formerly secretary of the Southern Gas Association, has joined the sales force of the Gas Light Co., of Augusta, Ga.

Chas. H. Baer, salesman for the Gas Light Co., of Augusta, Ga., has joined the colors along with Dr. Brewer, of Atlanta, brother of E. D. Brewer.

Harry B. Kircher, for several years superintendent of the St. Clair County Gas & Electric Co., and who has been in training at Fort Sheridan, has been commissioned first lieutenant of engineers.

M. F. Goodbody, of Omaha, now is manager of the Atlantic Gas Co., at Webster City, Iowa, and Marion Cook is engineer.

Henry E. McGowan, general manager of the Flatbush Gas Co., since 1903, has been elected secretary of the Brooklyn Union Gas Co., and its five subsidiary companies.

J. C. White, an engineer of the Portland (Ore.) Gas & Coke Co., is thought to have drowned. He left the plant at midnight to row across the river to his home. The following day the rowboat was found drifting.

Charles B. Hanley, of Nashville, Is Dead.

Charles B. Hanley, sales manager for the Nashville (Tenn.) Gas & Heating Co., died July 13th, of typhoid fever. He had been a resident of Nashville nine years and had been connected with the Nashville Gas & Heating Co. all of the time. He started into the company in the new business department, and since that time has had several promotions, the last of which was to the position of sales manager. He was a man who put his heart and soul into his work and it was by this that he has made his success.

Death of George P. Boothe of Bradford, Pa.

George P. Boothe, superintendent of the S. R. Dresser Manufacturing Co., Bradford, Pa., and identified with Mr. Dresser for about 25 years, died there very suddenly of uraemic poisoning on June 15th. He had been in his usual sturdy health up to within a few hours of his death. Mr. Boothe was a member of the National Gas Association of America and the National Supply Men's Association. He had for many years attended all the national conventions of these bodies and was widely esteemed as an authority on all mechanical equipment consumed by oil and gas producers.

Benjamin F. Harding, who was superintendent of the Bridgeton (N. J.) Gas Light Co., for half a century and one of Bridgeton's highly esteemed citizens, died July 20th, at Galen Hall Sanitarium, Atlantic City, from heart trouble. For some time Mr. Harding had been in failing health and he had gone to the seashore in an effort to regain his health. Three or four years ago Mr. Harding at his own request was relieved of the active superintendency of the company, being succeeded by the present superintendent, Jacob B. Jones. Mr. Harding retained his position as treasurer and so long as his health permitted spent a part of each day at the office.

H. G. Miller, purchasing agent of the Granville (Ohio) Fuel & Light Co., for 25 years, died recently.

James R. Richardson, formerly assistant treasurer of the Columbia Gas Co., died recently at his home in Cincinnati.

John S. H. Stokes, aged 25, assistant sales manager for the Gilbert & Barker Manufacturing Co., Springfield, Mass., died suddenly July 25th in Hartford, Conn., where he was passing a vacation.

J. H. Jowett, formerly general sales manager, has been elected vice-president of the Ingersoll-Rand Co., and L. D. Albin, formerly assistant general sales manager, was appointed general sales manager. Mr. Jowett and Mr. Albin will continue to make their headquarters at 11 Broadway, New York City.

H. L. Nichols has been elected secretary, treasurer and manager of the Minnesota Gas & Electric Co., Albert Lea, Minn., succeeding F. A. Otto, former manager.

Everett L. Turner has been placed in charge of the Old Colony Gas Co.'s business at Whitman, Mass.

Charles B. Richmond an employe of the Baltimore Gas Distribution Department, who had been sick for about 18 months died recently. He entered the service of the company on April 21, 1901.

H. M. Byllesby, who is chairman of the American committee on allied recruiting, was active in connection with the British-American recruiting week recently held in Chicago.

TO THE MANAGER:

THE GAS RECORD suggests that some one in your company be appointed immediately to supply the gas journals with news of your men who are engaged in military service. It is a very small task to send in this news, but it means a great deal to the man in the ranks and his friends and associates throughout the industry. It is very interesting to the industry to know, for instance, that John Smith, of the engineering, executive or commercial force of the Standard Gas Co., Someplace, Ind., is sergeant in B. Co., 110th Regt., U. S. A., in Camp Gordon, Georgia—and it will be even more interesting to read news of John Smith from time to time, as he writes back to the boys in the office, from the camp at home or abroad.

THE GAS RECORD hopes to establish and maintain a regular department for news of the boys in the service. See that news of your boys gets in THE RECORD.

J. S. Connelly, president of the Port Arthur (Texas) Gas & Power Co., has disposed of his interests in the company to the P. W. Brooks Co., of New York. He will be succeeded by F. E. Newberry.

H. H. Bechtel has been appointed secretary of the Twin State Gas & Electric Co., Brattleboro, Vt., succeeding G. L. Halstead.

W. E. Bertke, superintendent of the gas properties of the Utah Power & Light Co., in Ogden, for the past two and a half years, has resigned his position with that corporation and will become the manager of the Great Falls (Mont.) Gas Co.

John L. Tudbury, manager of the Salem (Mass.) Gas Light Co., was elected July 26th, to the board of directors of the company to fill the vacancy caused by the death of S. W. Winslow.

Chicago Begins To Operate Under New Rate.

Chicago began to operate August 1st under the new gas rate ordinance. President E. G. Cowdery, of the Peoples Gas Light & Coke Co., notified City Clerk James T. Igoe that the company had accepted the measure and that it had become effective at once. Beginning on the first the company started to supply gas of sixteen candle power and 565 B. t. u.'s instead of the 600 B. t. u. and twenty-two candle power gas formerly provided. The new rates will average 70 cents per 1,000 cubic feet.

Gas Street Lighting at Tulsa, Okla.

Tulsa, Okla., will install 60 natural gas lamps for street lighting, the equipment being furnished by the Sun Vapor and Gas Street Light Co., of Canton, O. Additional units will be installed later in the year.

Gas Distribution Meeting of Empire G. & E. Assn., Aug. 10.

The gas distribution committee of the Empire State Gas and Electric Ass'n has arranged for a meeting at the Nelson House, Poughkeepsie, August 10th. The following topics will be discussed informally: Cast Iron versus Wrought Iron for Gas Mains; Spellerized Steel Pipe for Gas Mains; Prevention of Gas Water Heater Accidents; Gas Meter Repairs; Use of a Compressed Air Machine for Caulking Pipe; The Use of Recording Charts Through a Cycle of Years; Distribution Mains for Outlying Industrial Consumers; Gas Demand Indicator; Automatic Gas Shut Off Valves.

"Dry" Gas Holder

Holland Plant Constructs Gas Holder Without Tank—New Departure

An interesting departure in the construction of gas holders recently was made at the plant of the Leerdam (Holland) gas company. The container is termed a "dry" gas holder because no tank is used. There is simply a stiffened shell closed by a moving disc, the circumference of which makes a gas tight seal with the inner wall of the shell, the disc or basin moving up and down in accordance with the gas content. It is stated that the lesser weight of the dry type of holder for a given capacity, as compared with the standard type, is of prime importance in Holland, where the ground is not suitable for supporting heavy loads. It is pointed out by Heer Daalen that this holder probably will be a considerable factor in preventing naphthalene troubles in the mains during the winter, as the holder will act as a condenser. This action will not be interfered with by the necessity of using steam to prevent water freezing, as in the case of a tank holder.

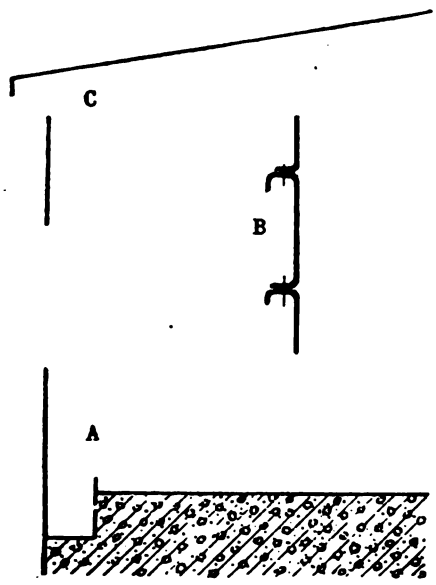


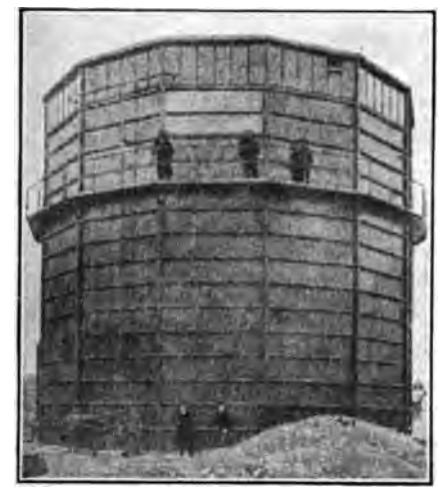
Fig. 1—Joining the Plates.

The London Gas World in a recent issue presents a few particulars supplied by Heer E. A. van Daalen, manager of the Leerdam works, to Hot Gas, the Dutch gas journal. The construction of the Leerdam holder was begun in September, 1916. There was a suspension of the work from December 28th until July 5th, but the holder was completed in the beginning of March, 1917. The building of the holder thus occupied four months, with only one mechanic on the job, the remainder of the labor employed being of an unskilled character. The holder is approximately 52 feet in diameter and 45 feet high, and has a capacity of about 70,000 cubic feet, capable of being increased to 123,000 cubic feet. The holder is polygmal in cross sections, with fourteen corners. In the bottom of the holder there is an annular tar trough for the reception of the tar leaking through the seal between the moving cover and the shell, this tar being pumped over and over again to the seal, so that there is little, if any, waste of tar. The construction and manner of jointing the plates of the shell are shown in Fig. 1. The holder is covered by a roof as shown, forming a chamber with glass sides, and here is situated an indicator for showing the position of the movable cover and consequently the contents of the holder. A specially constructed ladder gives access to this chamber, and a folding ladder gives access to the movable cover whatever its position at the time. The moving cover is guided by rollers acting in conjunction with the shell, and around its periphery there is an annulus for the reception of the sealing tar, the bottom of the annulus being formed of wooden wedges with springs, making a loose sliding fit with the shell. The annulus is divided into sections, so that should a leak develop in one it can be repaired without interfering with the working of the holder. There has been no trouble with excess tar passing through the seal, but, of course, the quantity passing in summer is larger than in winter. Gauges are provided for showing the level of the tar in the seal and in the bottom of the holder. In winter it may happen that the tar will freeze in the pipes, and provision has been made to deal with this condition by steam or hot water.

In the putting together of the holder, when the first ring of plates was fixed the movable cover was placed in position and the roof was mounted upon this, and then the subsequent rings of plates were fixed, until the full height of the holder was attained. So far there has been no trouble whatever in the working of the holder.

By-Product Coking Practice Presented in New Book.

A new book, "By-Product Coking," by G. Stanley Cooper, has been issued by Benn Bros., Ltd., of London. The author, realizing the need for a text book on this subject, has succeeded in giving an up-to-date account of the industry as it stands today. The writer has purposely avoided intricate technical explanations and chemical formulæ which would not be intelligible to the average reader. Unfortunately, death prevented Mr. Cooper from completing the final chapter of his book, which work was undertaken and finished by C. P. Finn, manager of the Hemsworth by-product coke ovens of the South Kirby, Featherstone and Hemsworth Collieries, Ltd. Chapters are devoted to each of the following subjects: Importance of the coking industry; the nature and preparation of coking coals; development of the by-product oven; operation of a by-product coking plant; systems of coke ovens; coal and coke handling machinery and gas exhausters; recovery of tar and ammonia; recovery of benzol; utilization of surplus coke oven gas; tar distillation; chemical tests; future development of the industry. The book, taken as a whole, is a valuable contribution to engineering literature. It is well illustrated, bound in cloth and is sold for $1.80 net by Benn Bros., Ltd., 8 Bouverie street, London, E. C. 4.



The Completed Tankless Holder.

Paper on Volatile Products of Coal Carbonization.

The Bureau of Mines has issued Technical Paper No. 140, by Guy B. Taylor and Horace C. Porter and deals with the chemical reactions which occur when coal is heated with exclusion from oxygen, and analyzes the new substances that appear as the result of such heating. The report contains numerous tables showing the results of this research, and illustrates an apparatus for carbonizing coal in a current of its own gas.

GAS ENGINEERING.

Candidates for Illinois Association Course Must Submit Names by August 15th.

The Illinois Gas Association which supports two research fellowships in gas engineering in the engineering experiment station of the University of Illinois, announces the following conditions which govern their establishment:

1. The Illinois Gas Association as represented by its secretary-treasurer, will pay to the University of Illinois, the sum of $500 for a period of four years to establish a research fellowship in gas engineering in the engineering experiment station.

2. The officers of the various companies represented in the Illinois Gas Association will be requested to nominate for this fellowship one or more members of their staff who are graduates in engineering from some reputable technical school, who are likely to be interested in and to profit by an opportunity for advanced study and research. Names to be sent to the secretary of the Illinois Gas Association.

3. The list of names thus secured will be transmitted by the secretary of the association to the director of the engineering experiment station of the University of Illinois, who will, following the usual procedure of the university in the selection of engineering experiment station research fellows nominate, from among those who meet the university's requirement for admission to graduate standing, the candidate from the list who best meets the requirement and gives largest promise of success in research in gas engineering.

4. In the event that the officers of the Illinois Gas Association fail to nominate men for this fellowship, the university authorities shall be free to proceed to select a man as is customary in the case of other fellowships.

5. The research fellowship in gas engineering shall be in all respects similar to the regular research fellowships in the engineering experiment station; that is, appointment to this fellowship shall be for a period of two years with a stipend of $500 a year, and one-half of the time of the holder of this fellowship shall be devoted to research work in some field of interest to gas engineers under the general direction of the engineering experiment station, and the other half to graduate study leading to the degree of master of science.

6. Upon notification of an appointment to this fellowship, the officers of the Illinois Gas Association will make payment to the University of Illinois the sum of $500 each year on or before the first day of September for a period of four years, with the possibility that it may be renewed at the expiration of that time.

7. It is mutually understood that with very minor modifications the present course in chemical engineering offered by the University of Illinois may be adapted to the needs of undergraduate students desiring to enter the gas business. The university agrees to consider such additions to or modifications in its existing course in chemical engineering as may be desirable to further meet the requirements of gas engineers, and it will announce in its annual register the fact that students may by election secure courses which are desired to fit them to enter the field of gas engineering.

8. The results of the investigations that may be carried on by the research fellow in gas engineering shall be the property of the University of Illinois for dissemination to the public through such channels as it may select. Reports of work done shall be rendered the association.

The names of candidates must be submitted to Secretary Horace Clark by August 15, 1917, Room 1331, Edison Building, Chicago, and must give name of candidate, address, age, name of technical school, date of graduation and degree obtained; also present occupation. Any one just entering the university may avail himself of this course; the more students who enroll for this course, the more elaborate it can be made.

ALABAMA COAL COST.

Manager Frueauff Says Prices for This Product Are Double Normal Costs.

THE GAS RECORD is in receipt of the following letter, on the subject of Alabama coal prices, from General Manager Harry D. Frueauff, of the Montgomery Light & Water Power Co.:

Regarding the article in the July 11th issue of your magazine, entitled "Coal Prices Greatly Reduced," I want to take exception to that part of it applying to this district. Your statement that the prevailing prices in Alabama have been from $5.50 to $5.75, etc., does not coincide at all with the experience we have had.

At no stage of the game, considering car shortage, threatened strikes, which applied twice in the last year, have we been requested to pay even in the open market but once a higher price than that now fixed, namely $4. We have paid $4.25 on a very small tonnage and the present price in effect is practically a 50-cent raise over existing market prices, which in turn are more than double, in some cases, treble, what the old contract prices were on gas and steam coal at least.

It may be that coal sold for domestic prices may have reached the price you speak of, but I take it your article is addressed to the gas industry and that the prices mentioned before and after are the experiences and expressions of the gas industry. This has not been the experience here and we purchase from ten to twelve thousand tons of gas coal per year and about the same amount of steam coal to supplement our water power capacity.

I hope the purchasers of coal will still find some avenues left to continue the interest of the government so that more complete investigation will show that prices are out of all reason and can be really reduced from the market prices in effect during the past six to eight months.

It should be stated here that the prices quoted in the article Mr. Frueauff refers to applied to domestic coals only. It is interesting to note, however, the rise in coal costs which the Alabama gas companies are contending with at this period.

GASOLINE SUBSTITUTE.

Coal Gas Being Tried in Cities of England, Writes United States Consul.

With the price of gasoline at 61 cents per gallon, retail, numerous substitutes for furnishing vehicular motive power have appeared on the market, says Vice Consul Hamilton C. Claiborne, Bradford, England, in "Commerce Reports." A development in the use of coal gas for automobiles has passed the experimental stage, a motor bus using coal gas having made the journey from London to Eastbourne and return, a total distance of 130 miles. The Grimsby municipality, which operates a system of motor-driven omnibuses to outlying districts, is said, after a trial extending over four months, to have effected a reduction in fuel cost per mile from 4.30d. to 1.66d., the price of gasoline being 61 cents per gallon, and gas 61 cents per 1,000 feet.

The only change made in the motor is the fitting of a butterfly valve in the air-intake pipe for the regulation of the air supply, which allows the engine to draw the gas in the correct quantity according to load and speed. It is claimed that an advantage accruing from the use of gas is that the engine is cleaner and the valves do not require grinding so often.

In Yorkshire the use of coal gas for automobiles appears to be increasing rapidly. Recently Harrogate adopted it, and now Halifax and Todmorden have decided to give it a trial. The necessary apparatus is relatively cheap and easily adjusted, consisting of a canvas bag with an inner layer of rubber, shaped like a mattress, which holds the gas drawn from the main, and is strapped to the top of the motor omnibus or to the rear of the automobile. The gas in the bag is connected with the induction pipe, and the engine is worked by the suction process in the same manner as the ordinary gasoline vapor induction.

The principal disadvantage to the use of coal gas for automobiles is the bulky container necessary for the gas. The use of gas for small cars has proved unsatisfactory by reason of the problem of adequate space for storage. A suitable cylinder for containing compressed gas is said to be necessary for the general usage of such fuel for motor cars, and the probability of the continued utilization of coal gas as a substitute for gasoline appears to depend upon facilities for storage or compression.

The Bureau Mines has issued technical paper 160, entitled "The Determination of Nitrogen in Substances Used in Explosives," by W. C. Copes and Guy B. Taylor.

Gas Being Made From Lignite at Sheridan, Wyoming.

Reports from Sheridan, Wyo., state that the Sheridan Gas Co. is now manufacturing gas from lignite slack. John T. Bacon, engineer and manager of the company, has long been working along these lines, and his efforts are reported highly successful. The plant at Sheridan began operations on May 18, and has a capacity of 150,000 cu. ft. per day, although the present demand is only about 30,000. The buildings are all of steel and concrete construction and absolutely fireproof. Pea slack coal is being used at present. Common slack gives just as good results, states Mr. Bacon, but the pea slack is cheaper, on account of the dirt in the common slack.

Gas Company Allows Its Men To Help Farmers.

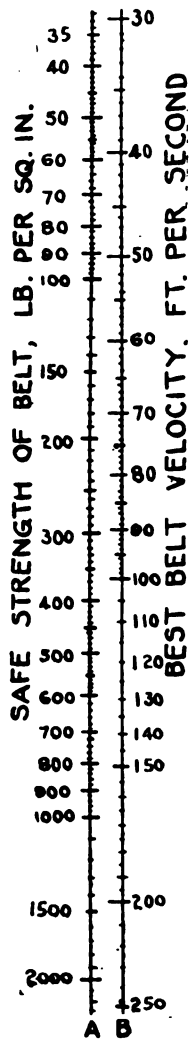
The Clarion (Pa.) Gas Co. has arranged to aid the farmers of that section to get their harvesting and farm work done. The men in the employ of the company will be hired out to the farmers at a rate of $2.25 a day, which is less than the company pays, and the difference in the wages will be made up by the company.

Data for Your Handbook

The Best Speed of a Belt.

Copyright, 1916, by W. E. Schaphorst.

There is no question but that centrifugal force will "explode" any belt if the speed of the belt is high enough. I have figured, for instance, that a leather belt of 1,000 pounds breaking strength per square inch will explode without pulling an ounce of load when running a trifle over three miles per minute. It is evident, then, that three miles per minute is too fast. No use running a belt and pulleys at that speed if they won't do anything. Also, a belt won't do anything when it isn't moving—when its velocity is zero. Therefore, somewhere between zero velocity and three miles per minute there is a "best belt speed," and at that speed the belt will transmit the most power.



*Copyright, 1917, W. F. Schaphorst, New York.

This chart gives the best speed for any leather belt of known safe strength. Find the safe strength of the belt in column A. Column B will then give the best velocity. All you need do is to glance across from Column A to Column B. For example, if the safe strength is 200 pounds per square inch (which would be a second-class leather belt), the best velocity is 74 feet per second. The chart's range is wide enough to include every possible strength for leather. Since cotton and canvas belts often weigh the same per cubic inch as leather belts this chart is equally applicable to such equal-weight belts.

It is assumed here that the belt is not subject to needless initial tension in addition to the tension of centrifugal force and the load tension on the tight side. If the initial tension method is practiced it is difficult to tell just what the best speed would be, because such practice sometimes breaks belts, even before they do any work at all. Certainly, high initial tension reduces the best speed to a much lower figure than given in this chart.

This chart, therefore, should prove to be an important aid in the selection of belts and pulleys. It shows clearly the advantages of strong belts, and high speed means high power. It shows that new strong belts should be run at high speed. As they grow older and weaker they can be used on slower drives and replaced on the high speed drive by new strong belts.

TABLE OF MELTING & BOILING POINTS

Substance	Symbols	Melting Points		Boiling Points	
		C	F	C	F
Aluminum	Al	657.3	1217	1800	3272
Antimony	Sb	624	1154	1440	2622
Bismuth	Bi	269.2	517	1430	2607
Bromine	Br	-7.3	45.2	61.1	142
Cadmium	Cd	321	610	782	1440
Chromium	Cr	1505	2792	2200	3992
Cobalt	Co	1490	2813		
Copper	Cu	1083	1892	2310	4192
Gold	Au	1063	1947		
Iron	Fe	1600	2912	2450	4442
Lead	Pb	326.9	621	1525	2777
Magnesium	Mg	632.6	1171	1120	2047
Manganese	Mn	1225	2232	1900	3452
Mercury	Hg	-38.85	-38	357	674
Nickle	Ni	1450	2647		
Phosphorus	P	44.2	111.5	287	558
Platinum	Pt	1755	3192		
Potassium	K	62.5	144.5	712	1372
Silicon	Si	1420	2592		
Silver	Ag	961	1651	1955	3552
Sodium	Na	97	206.5	750	1382
Sulphur	S	113.5-119.5	236-247	4447	837
Tin	Sn	231.5	451	2270	4118
Tungsten	W	2950	5347		
Zinc	Zn	419	787	918	1686

By-Product Coke and Gas Ovens and Capacities Built and Building in the United States and Canada

Company	Location	Number Ovens	Type	Annual coal consuming capacity	Annual coke producing capacity
Algoma Steel Co	Sault Ste. Marie, Ont	110	Koppers	610,000	410,000
Allegheny By-Product Coke Co	Glassport, Pa.	120	Otto	260,000	180,000
American Steel & Wire Co	Cleveland, O.	180	Koppers	1,150,000	790,000
Brier Hill Steel Co	Youngstown, O.	84	Koppers	520,000	330,000
By-Products Coke Corp	Chicago, Ill.	280	Solvay	1,300,000	860,000
Calhoun Gas Co	Battle Creek, Mich	18	Gas Mach. inclined slots*	36,000	25,200
Cambria Steel Co	Johnstown, Pa.	462	Various	1,530,000	1,150,000
Camden Coke Co	Camden, N. J	150	Otto	360,000	235,000
Carnegie Steel Co	Sharon, Pa.	212	Otto	830,000	540,000
Carnegie Steel Co	Clairton, Pa.	640	Koppers	3,960,000	2,600,000
Central Indiana Gas Co	Muncie, Ind.	22	Klonne	40,000	25,000
Central Indiana Gas Co	Muncie, Ind.	22	National Chamber	50,000	28,000
Central Iron & Coal Co	Holt, Ala.	60	Semet-Solvay	290,000	220,000
Central States Gas Co	Vincennes, Ind.	6	Parker-Russell inc. slots*	18,000	13,000
Chattanooga Gas & Coal Products Co.	Chattanooga, Tenn.	12	Roberts	74,000	48,000
Chattanooga Gas & Coal Products Co.	Chattanooga, Tenn.	24	Solvay	150,000	105,000
Citizens Gas Co	Indianapolis, Ind.	141	Otto-Solvay	650,000	430,000
Cleveland Furnace Co	Cleveland, O.	100	Solvay	450,000	300,000
Coal Products Co	Joliet, Ill.	53	Koppers and Wilputte	340,000	210,000
Colorado Fuel & Iron Co	Pueblo, Colo.	120	Koppers	720,000	475,000
Dominion Steel Corp	Sydney, Nova Scotia	120	Koppers	660,000	430,000
Dover By-Product Co	Canal Dover, O	24	Roberts	120,000	72,000
Empire Coal & Coke Co	Geneva, N. Y.	46	Solvay	146,000	95,000
Gulf States Steel Co	Alabama City, Ala	37	Koppers	230,000	161,000
Hamilton Otto Coke Co	Hamilton, O.	100	Otto	240,000	150,000
Illinois Steel Co	Joliet, Ill.	280	Koppers	1,500,000	1,100,000
Indiana Coke & Gas Co	Terre Haute, Ind.	30	Gas Mach.	190,000	133,000
Indiana Fuel & Light Co	Auburn Junction, Ind	6	Russell Eng. inc. slots*	12,000	8,000
Indiana Steel Co	Gary, Ind.	700	Koppers	4,500,000	3,420,000
Inland Steel Co	Indiana Harbor, Ind	130	Koppers	890,000	610,000
Ironton Solvay Co	Ironton, O.	60	Solvay	390,000	270,000
Kentucky Solvay Co	Ashland, Ky.	108	Solvay	800,000	544,000
LaBelle Iron Works	Follansbee, W. Va	94	Koppers	580,000	390,000
Lackawanna Iron & Steel Co	Lebanon, Pa.	228	Otto	500,000	340,000
Lackawanna Steel Co	Buffalo, N. Y.	469	Otto and Rothberg	1,350,000	900,000
Laclede Gas Light Co	St. Louis, Mo	56	Koppers	320,000	220,000
Lehigh Coke Co	South Bethlehem, Pa	424	Koppers	2,400,000	1,800,000
Linton Gas Co	Linton, Ind.	3	Gas Mach. inc. slots*	6,000	4,200
Maryland Steel Co	Sparrows Point, Md	360	Koppers	2,200,000	1,500,000
Michigan Alkali Co	Wyandotte, Mich.	54	Otto	195,000	120,000
Michigan Light Co	Flint, Mich.	48	Gas Mach. inc. slots*	96,000	67,200
Michigan Light Co	Kalamazoo, Mich.	15	Parker-Russell inc. slots*	46,000	32,000
Milwaukee Coal & Gas Co	Milwaukee, Wis.	160	Solvay	732,000	490,000
Minnesota By-Product Coke Co	St. Paul, Minn	65	Koppers	380,000	253,000
Minnesota Steel Co	Duluth, Minn.	90	Koppers	600,000	400,000
National Tube Co	Lorain, O.	208	Koppers	1,320,000	880,000
National Tube Co	Benwood, W. Va	120	Solvay	270,000	180,000
New England Gas & Coke Co	Everett, Mass.	400	Otto	650,000	400,000
North Shore Gas Co	Waukegan, Ill.	13	Solvay	55,000	35,000
Northwestern Iron Co	Mayville, Wis.	72	Otto	330,000	220,000
Nova Scotia Tramway & Power Co	Halifax, Nova Scotia	24	Russell Eng. inc. slots*	21,000	14,000
Pennsylvania Steel Co	Lebanon, Pa.	90	Solvay	387,000	260,000
Pennsylvania Steel Co	Steelton, Pa.	180	Solvay and Koppers	891,000	600,000
Philadelphia S. G. & E. Co	Chester, Pa.	40	Solvay	140,000	84,000
Portsmouth Solvay Co	Portsmouth, O.	60	Solvay	384,000	261,000
Public Utilities Co	Evansville, Ind.	24	Gas Mach. inc. slots*	48,000	33,600
Republic Iron & Steel Co	Youngstown, O.	143	Koppers	1,020,000	680,000
River Furnace Co	Cleveland, O.	204	Koppers	1,300,000	860,000
Seaboard B. P. Co	Jersey City, N. J	110	Koppers	680,000	470,000
Seattle Lighting Co	Seattle, Wash.	20	National Chamber	55,000	30,000
Semet-Solvay Co	Dunbar, Pa.	110	Solvay	248,000	165,000
Solvay Process Co	Syracuse, N. Y.	40	Solvay	65,000	42,000
Solvay Process Co	Delray, Mich.	175	Solvay	1,020,000	690,000
Tennessee Coal, Iron & Ry. Co	Fairfield, Ala.	280	Koppers	1,650,000	1,140,000
Tennessee Coal, Iron & Ry. Co	Ensley, Ala.	240	Semet-Solvay	500,000	350,000
Toledo Furnace Co	Toledo, O.	94	Koppers	560,000	360,000
United Furnace Co	Canton, O.	47	Koppers	280,000	180,000
Waterbury Gas Light Co	Waterbury, Conn.	27	Gas Mach. inc. slots*	54,000	37,800
Wickwire Steel Co	Buffalo, N. Y.	60	Solvay	386,000	258,000
Woodward Iron Co	Woodward, Ala.	230	Koppers and Wilputte	1,350,000	940,000
Youngstown Sheet & Tube Co	Youngstown, O.	306	Koppers	1,950,000	1,330,000
Zenith Furnace Co	Duluth, Minn.	80	Otto	200,000	130,000

*Small inclined slot gas ovens—a recent development. Sometimes termed "inclined retort chambers."

PROBLEMS IN THE GAS BUSINESS

Conducted by W. M. Henderson, Assistant Engineer Gas Department, Pacific Gas & Electric Co., San Francisco.

ANSWERS TO QUESTIONS.

215—Tar From Retorts.

Is there any difference in the yield of tar and such products from vertical retorts compared with the old horizontals?

The tar from the continuous vertical retorts is no more valuable than that from the horizontals. When taken from the hydraulic main it is quite fluid, but becomes viscous upon cooling. After standing for some time in the well it contains more water in suspension than that from horizontals, and this becomes very noticeable when distilling as it has a great tendency to froth and bubble over.

Creosote Oil—That from the horizontals had a density of 9° to 10° Tw. with a tendency to become pasty and deposit naphthalene. With the advent of the verticals the density began to fall until it stood at less than 3° Tw., and the oil would remain quite fluid at 0° C., though much naphthalene was present. This creosote contained at least 16 per cent. of tar acid, but none of a crystallizable nature that could be sold as crude carbolic. Such creosote oil was obviously rich in cresylic acid. The oil complied with contract requirements in regard to boiling point, percentage of tar acids and amount distilling over at 600° F., but fails in the requirements that the first 25 per cent. distilling over must be heavier than water.

Crude Carbolic Acid—This was at least 25 per cent. below the usual quantity, and the crystallizing point of the usual distillate fell from 60° to 40° F. This decrease was due to the use of a weaker solution of caustic soda in order to obtain a crude acid that would crystallize and be merchantable. The new tar is richer in the acids of higher boiling points than the old.

Benzol and Naphthas—The yield of benzol with the verticals is smaller than with the horizontals, but of solvent and the heavy naphthas is higher. Their composition and gravity also differ. For years the density of benzol and solvent naphtha was about 0.880 and of the heavy naphtha 0.910 to 0.920; but recently the gravity of the 50/90's benzol dropped to 0.860, and that of the solvent naphtha to 0.845. It would appear from distillation tests that the benzol and solvent naphtha from the verticals contain appreciable quantities of the paraffin hydrocarbons which boil between 70° and 175° C. In the heavy naphtha and light creosote oil a greater percentage of the still higher members of the paraffin series must be present, all of which lowers the density of the tar products in which they occur without materially affecting their boiling points or distillation properties.

The tar from the hydraulic main gave about 65 per cent. of medium soft pitch or about 50 per cent. of very hard pitch. As far as can be judged there is no naphthalene trouble with the gas nor with the creosote oil nor the naphthas, nor has there been any difficulty in selling the various liquid products at the ruling prices. It was different, however, with the crude carbolic acid of which there was a shortage in both quantity and quality.

This department will supply information on problems arising in every department of the gas industry. Your co-operation is solicited, both in asking and answering questions. Address: W. M. Henderson, Pacific Gas & Electric Co., 445 Sutter St., San Francisco, Calif.

NEW QUESTIONS.

226—Waterproofing Masonry.

What is the best practice to obtain waterproof concrete walls?

227—Electrolysis.

What is now the accepted practice to prevent electrolysis and what satisfaction is being obtained with the use of pipe coatings?

228—Blaugas.

What is Blaugas and how does it compare with other combustible gases?

The writer believes that with the increased production of tar from continuous verticals, the large amount of tar present will cause much greater corrosion inside tar stills than heretofore.

221—Interior Lighting.

In planning a lighting system for interiors, particularly homes, what are the essentials that must be considered, and can you give a salesman a few good tips?

C. A. Luther, of the Peoples Gas Light & Coke Co., Chicago, some time ago before the American Gas Institute, read a good article on just this subject. The following is condensed from his paper:

In the opinion of the writer, too much consideration is given to advertising suggestions from manufacturers and not enough to results actually obtained under working conditions. Practically every large gas company employs at least one engineer who is competent to make experiments of lighting systems; and if these engineers would only make their investigations along practical lines and give their results to the lighting fraternity, the average representative would be more successful in giving his customers the best and latest lighting effects. The customers' first thought is installation cost, then appearance of equipment, and then cost of operation. The engineer or representative must consider first harmony of the fixture with the surroundings, amount of illumination necessary and received from the fixture, and finally service in its various phases.

A plan tried by the author to secure good lighting is to have the representative sketch on cross-section paper the room to be lighted and to indicate dimensions, location of furniture, etc. This sketch is turned over to a draughtsman, who makes a plan and adds the location of the lamps and the height at which they are to be hung. Blue prints are sent to the customer for his approval, to the fitter, and to the solicitor who secured the sale. After the installation is complete a photograph is taken and filed for exhibition to some other prospective customer.

RESIDENCE AND APARTMENTS.

Living Room—The lighting should be so arranged as to have a comfortable amount of general illumination, which can be secured from the central fixture, so arranged as to permit a soft light on the center table. In addition to this, side brackets should be installed where localized lighting is required, such as at the piano and over couches and chairs, so that the occupants may receive a semi-concentrated light upon the book or paper. In a moderately sized room the side brackets may be replaced by portable lamps. Another method is to use the central fixture to illuminate the whole room. In this case a soft light cannot be considered, but the center outlet should be equipped with a two, three or four light unit, according to the size of the room. The fixture should be equipped with semi-concentrating glassware that will permit a considerable portion of the light to diffuse downward within the area in which it is desired to read, and at the same time to radiate in all directions to secure good general illumination.

Library—The general rules in regard to living rooms apply also to illumination of the library. Soft lighting with local illumination where it is desired to read should be obtained.

Bed Room—Bed room lighting where there is only one outlet is a difficult task, as at different times the light is needed at various points. The most essential place is at the dresser, and then it must be so arranged as to eliminate all harsh shadows. One method is to locate a light directly above the mirror, while another is to have one on each side of it. There should be a central unit of some sort for general illumination, in addition to which it is desirable to install one or more units at the head of the bed equipped with a semi-concentrating light and by-pass cock. Another point of primary importance is to foresee the location of the furniture.

Bath Room—The bath room should have on each side of the mirror a small mantle light with a globe that will give good diffusion. In large rooms a central drop pendant is also permissible.

Dining Room—The dining room is the easiest room to light. Practically all that is essential in the average sized room is to have a semi-concentrated light on the table, the reflection from the white cloth giving enough general illumination for the rest of the room. Where a dome is used, care should be taken that the light is hung low enough so that the eye is shielded from the light, and at the same time high enough so that the person at the opposite side of the table is visible.

Kitchen—Good illumination must be provided in the kitchen to insure cleanliness and good service. An illustration is given of a kitchen lighted by a central two-light drop carrying reflex lamps with

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is of the same general design and operates on the same principle as the well known Junkers Calorimeter, which has heretofore been regarded by gas experts as the most satisfactory form of calorimeter in use. We have, however, made some valuable improvements in the instrument, with a view to overcoming certain troublesome features in the original, making it easier to operate, and we find these improvements very acceptable to the users of the calorimeter.

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Those who read ads profit as well as those who insert them.

opal globes, with side brackets over the sink, between the cabinet and the stove, and over the ironing board.

Laundry—It is necessary also to have good light in the laundry, as much of the work is done after dark, and this room is usually in the darkest part of the house. A cut is given of a laundry lighted by a three-light fixture with reflex lamps and alba shades.

LARGE AREA LIGHTING.

Here it will be necessary to have concentrated or general illumination or a mixture, with elimination of sharp shadows. The quality of the light must harmonize with the surrounding architectural features and decorations. The points to be considered are: (1) The source of light must be protected so that there will be no glare; (2) the globes must be large; (3) the diffusion throughout the sphere must be perfect; (4) the general good illumination of walls and ceilings derived from an ornamental installation must be pleasing to the eye; (5) allowance must be made for individual taste as differentiated from light as of physical quantity. In lighting a large hall we must install units that will give good general distribution of medium intensity, and so placed that good general distribution without glare will be obtained.

STORE LIGHTING.

The proper lighting of stores requires much study as the quantity of light must vary for different classes of business. For instance, the fixtures must be closer together with dark surroundings than with light. In store lighting it is not entirely a question of the amount of light on the counters and shelves, but of the effect of the lighting on the public. The proprietor of a store considers his lighting effects as an advertisement, and it is, therefore, the place of the gas company to know what is required for his particular needs. It is of prime importance to install all units as high as is consistent with efficiency in order to give good distribution and to remove glare.

POOL AND BILLIARD ROOM LIGHTING.

Uniform illumination of sufficient intensity must be provided on the table and all shadows upon it eliminated; the lights must be kept out of the player's eyes; the shades over the tables must be protected from the cues; and, finally, there must be some units with suitable diffusing glassware for general illumination.

FACTORY LIGHTING.

The lighting of factories may in most instances be classed under lighting large areas and may be done by uniformly spaced large units or by placing a small unit near each machine. Care should be taken to protect the operator's eyes from glare. The use of large units permits the flooding of the whole area with enough light for all purposes and does away with deep shadows, thereby reducing eye-strain and approaching daylight effects. Machine shops especially require as good lighting as drafting rooms, which is more than the average. It is important that there should not be any sharp shadows around the tools nor glare from them. Where it is necessary to light a particular machine or a bench along the wall, one-mantle inverted units with suitable reflectors may be installed. Where there is vibration, anti-vibrators should be employed.

REPEAT QUESTIONS.

219—Artificial Gas For Autos.

What conditions would we be confronted with in adapting gas for motor fuel? What are the possibilities of such?

220—By-Products.

In what way can we realize the most from our by-products?

225—Solvent for Acetylene.

Has there ever been used commercially any other solvent for acetylene other than acetone?

223—Volume of Flue Gases

What are the respective volumes of flue gases from the combustion of (1) carburetted water gas per cu. ft.; (2) coal gas; (3) anthracite coal per lb.; (4) bituminous coal per lb.; (5) charcoal; (6) coke?

In order to calculate the volume of the flue gases or products of combustion it is necessary to know the composition of the fuel in per cent. by weight or volume. If we take bituminous coal as an example, and assume that its chemical composition is

88.89 per cent. carbon
2.58 per cent. oxygen
4.15 per cent hydrogen
2.78 per cent. sulphur
1.60 per cent. ash

it is possible to calculate the products of combustion for the carbon, hydrogen and sulphur combined with oxygen in a fixed proportion, according to their atomic weights. Carbon (C) combines with oxygen and forms carbon dioxide (CO_2). The atomic weight of carbon is 12 and that of a molecule of carbon dioxide 44, so that in 44 pounds of CO_2 gas there are 12 lbs. of carbon ,and 32 lbs. oxygen, or 1 lb. carbon requires 32/12, or 2.66 lbs. of oxygen for its combustion. Similarly, two atoms of hydrogen combine with one of oxygen to form one molecule of water (H_2O). The atomic weight of hydrogen is one and that of a molecule of water 18, so that in 18 lbs. of water there are 16 lbs. of oxygen and two lbs of hydrogen, one lb. of hydrogen requiring for its combustion eight lbs. of oxygen. In like manner the sulphur burns to sulphur dioxide gas (SO_2) sulphur having an atomic weight of 32, and SO_2 a molecular weight of 64. Sixty-four lbs. of SO- thus contains 32 lbs. of oxygen, or each pound of sulphur required one lb. of oxygen for its combustion.

The ratio of air to the oxygen contained in air is about 4.348 to one by weight, hence

Air required for combustion

Carbon .....2.667×4.348=11.596 lbs.
Hydrogen .....8 ×4.348=34.784 lbs.
Sulphur .....1 ×4.348= 4.348 lbs.

Then for the coal as above given the air for combustion

Carbon .....11.596×.889=10.309
Hydrogen .....34.784×.038= 1.322

where $4.15 - \frac{2.58}{8} = 3.83$

Sulphur .....4.348×.028=$\frac{0.122}{11.753}$ lbs. air

The hydrogen gas burns to water vapor which condenses and to an extent the sulphur as SO_2 is soluble in this vapor, so as gases of combustion these two are not considered. Of the balance, .889 lb. carbon burns to 28.01 cu. ft. CO_2 and of the 11.753 lbs. of air 9.04 lbs. is nitrogen or 122.67 cu. ft. The total products amount to 150.68 cu. ft. This is all theory. In practice it is found necessary to have about 50 per cent. excess air and even then it is hard to get complete combustion. In practice one lb. of coal burned to form a chimney gas as follows

CO_2.....11.5 per cent. by volume
CO ..... 0.9 per cent.
O ..... 7.4 per cent.
N_2.....80.2 per cent.

The volume of the products per lb. of coal

22.10 cu. ft. CO_2
1.74 cu. ft. CO
14.20 cu. ft. O
154.10 cu. ft. N_2

192.14 Total cu. ft.

This is possible when the air ratio is about 1:55 to one in excess of theoretical quantity required which is the usual practice.

From this it is very simple to calculate the products of combustion from coke, charcoal and anthracite coal as they are all very near pure carbon. As 3.66 lbs. CO_2 is produced per lb. of carbon and one lb. of CO_2 weighs at 60° Fahr., .1172 lbs. then 3.66 lbs. has a volume of 31 cu. ft.

3.66÷.1172=31 cu. ft. CO_2. The air necessary for the combustion of one lb. of carbon is 11.596 lbs. of which 77 per cent. is nitrogen, or 8.92 lbs. Nitrogen weighs at 60° Fahr. .0745 lbs. per cu. ft., then

8.92 lbs.÷.0745=119 cu. ft. N_2.
And 119 cu. ft.
31 cu. ft.

150 cu. ft. volume of products of combustion at 60° Fahr.

To calculate the products from the combustion of a cubic foot of gas is not so simple, for though the analysis of the gas may be known the exact composition of the illuminants is not always known. Various quantities of air are necessary for the combustion of different hydrocarbons. But for coal gas or carburetted water gas it can be approximated close enough for practicable purposes. The reaction that takes place with combustion in the case of (CO) carbon monoxide

$$2CO+O_2=2CO_2$$

or one cu. ft. CO will combine with ½ cu. ft. oxygen and form one cu. ft. CO_2. Since by volume the air contains 3.77 cu. ft. nitrogen to one of oxygen there will be $\frac{3.77}{2}$=1.89 cu. ft. of nitrogen. The total products from combustion of one cu. ft. CO will be 2.89 cu. ft.

In the case of (H) hydrogen

$$2H_2+O_2=2H_2O$$

or one cu. ft. hydrogen will combine with ½ cu. ft. oxygen and produce one cu. ft. water vapor. The volume of nitrogen produced will be the same as in the combustion of carbon monoxide.

Marsh gas or methane, CH_4

$$CH_4+2O_2=CO_2+2H_2O$$

or one cu. ft. methane combines with two cu. ft. oxygen to produce one cu. ft. CO_2 and two cu. ft. water vapor. (The water vapor condenses in the case of hydrogen and methane.) The volume of nitrogen produced from combustion of methane will be 3.77×2=7.54 cu. ft. The total

products are thus 8.54 cu. ft. For convenience the results are tabulated.

Name.		Volume of products produced by combustion of one cu. ft. of substance. CO_2	H_2O	N_2
Carbon monoxide	CO	1	....	1.89
Hydrogen	H_2	....	1	1.89
Methane	CH_4	1	2	7.54
Ethane	C_2H_6	2	3	13.20

We can take a coal gas of the following composition and work out from it the products of combustion:

Illuminants	3.0 per cent.
Methane	30.0 per cent.
Hydrogen	50.0 per cent.
Carbon monoxide	8.0 per cent.
Carbon dioxide	4.0 per cent.
Oxygen	.2 per cent.
Nitrogen	4.8 per cent.
	100.0 per cent.

If we multiply the volume of products from combustion by the per cent. by volume of the different gases and point off the two places, we will obtain as a sum the total products from the combustion of the gas. Thus—

C_nH_{2n}	.03× .2 =	.06
	.03×13.2 =	.396
CH_4	.30× 1 =	.30
	.30× 7.54=	2.262
H_2	.50× 1.89=	.945
CO	.08× 1 =	.08
	.08× 1.89=	.151
		4.194 cu. ft

To	4.194	cu. ft.
Add CO_2	.04	cu. ft.
O_2	.002	
N_2	.048	
Total	4.284	cu. ft.

Volume of products.

For my own purpose I never go through such a calculation, but use a short cut if the heating value of the gas is known. This is determined from the fact that a combustible mixture of gas and air of the volume of one cu. ft. has a heating value of 100 B. t. u. This is the case regardless of the quality of gas. Thus a carburetted water gas of 750 B. t. u. or a 550 B. t. u. coal gas would when mixed with air for proper combustion, in either case show 100 B. t. u. per cu. ft. of mixture. From this fact it is easy to calculate the air necessary for combustion, or

$$\frac{\text{B. t. u.}}{100} - 1 = \text{cu. ft. air for combustion,}$$

$$\text{or } \frac{750}{100} 7.5 - 1 = 6.5 \text{ cu. ft. air.}$$

The constituents of artificial gas, excepting the illuminants, will burn to their own volume of CO_2 as was noted in a previous paragraph. As the illuminants are usually low the products from their combustion is not great. Thus it is possible to assume the air for combustion to equal the products of combustion. In the case of the coal gas, analysis given above, the calculated heating value is 560 B. t. u. the air for combustion of one cu. ft. would be

$$\frac{560}{100} - 1 = 4.6 \text{ cu. ft.}$$

which can be taken as the volume of the combustible products. This checks fair enough with calculated results. As a matter of fact it would never do to accept calculated results, for those that are to be obtained in practice, 50 per cent. excess air is usually found necessary.

224—Compressed Air.

Can an ordinary steam engine be worked satisfactorily with compressed air in place of steam?

Compressed air has been used as a source of power in connection with retort house machinery and for machinery in mines; and we know of no reason why an engine that can be worked by steam at 50 lbs. pressure should not run equally well under air compressed to an equal extent. The expansion of the air in the cylinder is attended with loss of heat, which might possibly give trouble at high expansions, from the formation of snow, if water vapor was present in the air used. But we believe that the use of compressed air as a means of transferring power is largely replaced by electricity. In the natural gas districts of Pennsylvania, where gas (consisting chiefly of methane) issued from the borings at 100 or 150 lbs. pressure, it is usual to utilize it by making a connection with the steam inlet of an ordinary engine. There is no special virtue in steam, apart from the cheapness and convenience of generating it. Any other non-condensible and non-corrosive gas would answer equally well. The choice of the agent is dependent upon considerations of economy.

CANADIAN CONVENTION.

Attractive Programme Arranged for Annual Meeting At Toronto, Aug. 29-30.

As announced last issue, the Canadian Gas Convention will be held at Toronto, August 29-30. In the proceedings this year are included a couple of papers of special interest to the smaller gas companies. The meeting will be more or less informal, but includes much to interest all, at practically no expense while there. The association and Consumers Gas Co. will provide for members and friends the Yacht Club luncheon, visit to the Canadian National Exhibition in free cars on first day, and a night entertainment before the grand stand.

This being Confederation year, a special entertainment and other features are provided by the exhibition authorities. Although there is no regular gas exhibition in connection with the convention, the main dealers in gas appliances will make special displays of their goods at the exhibition, and the Consumers Gas Co. will have from eight to ten large booths exhibiting all classes of appliances, from the smallest household articles to big industrial fuel equipment. These appliances will be in operation and a visit to all of them is on the program. Owing to the convention being held during the time of the exhibition, it will be necessary for intending delegates to send reservations early to Secretary-Treasurer George W. Allen, at 19 Toronto Street, Toronto.

WEDNESDAY MORNING, AUGUST 29.

Members and friends will meet at the King Edward Hotel at 9:00 to 9:30 A. M., August 29th, leaving at 9:30 for the Royal Canadian Yacht Club boat and sailing from the dock, foot of Yonge Street for the club house on the island. Following is the tentative program for the meeting:

10:15 to 10:30 A. M.—Executive committee meeting; registration of members and friends.

10:45 A. M.—Meeting called to order by the president. Address of welcome by Mayor T. L. Church; reading of the minutes of the last annual convention; report of the executive committee; report of the secretary-treasurer; president's address; appointment of nominating committee, and election of officers for the ensuing year.

11:45 A. M.—Two short papers and discussions.

1:00 P. M.—Meeting adjourns for luncheon in club house.

WEDNESDAY AFTERNOON.

3:30 P. M.—Leave island on 3:30 boat for city, thence by private cars to Toronto exhibition, arriving at 4:30 P. M.

4:30 P. M.—Visit to gas exhibits, the Consumers Gas Co. having large displays; then a visit to the other buildings and grounds.

6:00 P. M.—Adjourn for dinner.

7:00 P. M.—Grand stand performance. Reserved seats provided.

THURSDAY MORNING, AUGUST 30.

Thursday will be an open day, free to all. In addition to taking in the Canadian National Exhibition, the following places of interest will be worth visiting: Normal school, Avenue Road Hill district, Rosedale section, Royal Ontario Museum and Dominion observatory, Parliament buildings, New General hospital, Riverdale Zoo and Park, Hanlan's Point, Island Park, Harbour Development Work, Reservoir Park, University buildings, Allen Gardens, etc.

American Chemical Society Meets at Boston September 11-13.

The American Chemical Society will hold its September meeting in the new building of the Massachusetts Institute of Technology, Charles River Road, Cambridge, September 11th, 12th and 13th.

Wisconsin G. & E. Co. Refinances To Cover Growing Requirements.

The Wisconsin Gas & Electric Co., of Kenosha, Wis., which operates electric and gas light utilities in several cities in southern Wisconsin, has increased its capital stock from $2,750,000 to $3,350,000 to provide for extensions and improvements.

U. G. I. Sales for Quarter Break Record.

The United Gas Improvement Co.'s statement of gas sales for the quarter ended June 30th shows a larger amount of money received for gas sold in that quarter than in any previous quarter since the gas works lease went into effect. The sum was $2,707,075. The city's share was $541,412, making a total for the first six months of the current year of $1,132,803 compared with $1,053,320 last year.

CONSTRUCTION NEWS

DETROIT'S PROGRESS.

Company Is Building for Future, Regardless of Present High Costs.

Extension and development to meet conditions from one to five years from now are being carried out by the Detroit City Gas Co., involving immense investment of capital. These improvements and preparations for a city of more than 1,000,000 population are being made without regard of high costs of materials, labor and other elements.

Charles W. Bennett, general manager of the company, states that this year will see the installation of 75 miles of gas mains in the more rapidly growing districts, while steel piping into the homes and buildings of customers will require 1,000,000 feet of such material.

This same program will be duplicated next year. In 1916 the company installed 73 miles of mains, most of which are not yet in use, but are being held in readiness for the future growth of the city.

Demonstrating the company's faith in the rapid expansion of the newly built up residential section out Grand River Avenue, it has acquired 10 acres at Tireman Avenue and the Pere Marquette Railroad on which is being erected an immense steel gas holder which will have capacity for 3,000,000 cubic feet of gas. This tank will be similar to the huge container at Belle Isle Bridge. In addition to this the company is erecting a large pumping station on the site which will bring gas from the Delray producing station and furnish the pressure for distribution.

The company now has 10 stations about the city, so connected that there can be a constant interchange of the gas supply at any time. A 7,000,000 cubic feet per day capacity water gas machine is being completed at the Twenty-first Street plant, and General Manager Bennett has just let contracts for a similar machine.

Detroit's progress in the extension of its gas facilities exceed those of such cities as Chicago and Philadelphia this year, it is stated. The city has been fourth in gas consumption for several years past, according to officials of the company, and, because of the importance of the industry, it is regarded as not unlikely that the Government may call on the company soon to furnish much of the toluol it will require in the manufacture of high explosives for war purposes.

Bartlett Hayward Co. Complete Big New Jersey Holder.

A large gas holder has been completed for the Public Service Gas Co., of New Jersey, near Dock Street, Hackensack, by the Barlett-Hayward Co., of Baltimore. It is 144 feet in diameter, 177 feet high and has a capacity of 2,000,000 cubic feet. The tank is probably the highest point in Bergen county, with the exception of the Palisades.

BALTIMORE BUILDS.

A 30-inch Pipe Line To Transport Coke Oven Gas from Sparrows Point.

George Beadenkopf, chief engineer for the Baltimore Consolidated Gas Co., has a very interesting article in the latest issue of the Baltimore Gas & Electric News on the new facilities his company is providing. At present the gas supply of Baltimore is made up of carburetted water gas, manufactured at the Spring Gardens Station of the Consolidated Gas, Electric Light & Power Co., and of coke oven gas, manufactured as a by-product by the Bethlehem Steel Co., at its Maryland Steel Plant, Sparrows Point. The coke oven gas is pumped from the steel company's plant through a pipe line 12½ miles long to Spring Gardens Station, in South Baltimore, where it is purified and mixed with carburetted water gas before distributing it to the consumers. The coke oven gas is produced by the Steel company in a battery of 120 Koppers' ovens, which installation is now being increased by an addition of 240 Koppers' ovens, which will make a daily capacity of by-product gas of approximately 36,000,000 cubic feet. To convey this increased quantity of coke oven gas to Baltimore, the Consolidated company is laying five miles of 30-inch cast iron pipe from Sparrows Point to Canton station and an additional 24-inch steel pipe across the Bear Creek trestle. Besides this installation, the company is erecting sixteen 21 by 35 by 12-foot deep purifying boxes at Spring Gardens Station, for the purpose of purifying the large volume of coke oven gas. When the full volume of coke oven gas is ready for delivery, the company will be required to manufacture very little water gas at its Spring Gardens Station.

DON'T WORRY: THE LITANY OF THE FRENCH SOLDIER

Of two things one is certain: Either you're mobilized or you're not mobilized.

If you're not mobilized there is no need to worry; if you are mobilized, of two things one is certain: Either you're behind the lines or you're on the front.

If you're behind the lines there is no need to worry; if you're on the front, of two things one is certain: Either you're resting in a safe place or you're exposed to danger.

If you're resting in a safe place there is no need to worry; if you're exposed to danger, of two things one is certain: Either you're wounded or you're not wounded.

If you're not wounded there is no need to worry; if you are wounded, of two things one is certain: Either you're wounded seriously or you're wounded slightly.

If you're wounded slightly there is no need to worry; if you're wounded seriously, of two things one is certain: Either you recover or you die.

If you recover there is no need to worry; if you die you can't worry.

Extension of Mains Continues Despite High Prices.

The Illinois Gas Co. has petitioned the Board of Supervisors of Lawrenceville for a franchise to lay a gas line between Vincennes, Ind., and Olney, Ill.

The East Ohio Gas Co. has been authorized to lay a 10-inch gas main between Newburg and Peninsula, a distance of 15 miles.

The Los Angeles Gas & Electric Corp'n has asked permission of the state commission to extend its mains to Monterey Park.

Gas Plant at Ottawa, Ill. To Be Rebuilt.

The Public Service Co. of Northern Illinois is to dismantle the gas works at Evanston, Ill., and rebuild the plant at Ottawa.

New Apparatus Being Installed at Goldsboro, N. C.

H. D. Wood, general manager of the New Bern (N. C.) Gas & Fuel Co. and Goldsboro (N. C.) Gas & Fuel Co., is installing an additional boiler and water gas machine at the Goldsboro plant. When the new machine is installed it will take care of the future growth of Goldsboro for some time to come.

New Mains Authorized for Sheridan, Wyo.

The Sheridan (Wyo.) Gas Co. has been granted permission by the city council to proceed with the laying of gas mains and pipes, interrupted by the bad weather last fall and which owing to rush of other work could not be taken up so far this spring and summer. The number of gas consumers in Sheridan has increased steadily since hot weather set in and the present waiting list is steadily growing, the company reports.

The contract for approximately $15,000 worth of different sized gas pipe and fittings for the Hamilton (Ohio) gas department has been awarded to the Scioto Valley Supply Co., of Columbus. Delivery of the goods is expected at once.

NATURAL GAS DEVELOPMENTS

COMMITTEE NAMED.

Five Natural Gas Men To Act With Council of Defense and Subcommittee.

In accordance with the action at the convention of the Natural Gas Association in Buffalo, on May 18th, a committee of five has been appointed to represent the association, in rendering all possible assistance to the Committee of National Defense and its subcommittees. This committee consists of: Glenn T. Braden, George W. Crawford, J. C. McDowell, John G. Pew, and Joseph H. Guffey, president of the National Gas Association. This committee will report to two of the sub-committees of the Committee on National Defense.

On questions of production of natural gas, and of gasoline, they will report to A. C. Bedford, chairman of the committee on petroleum. On questions as to the distribution of natural gas, they will report to John W. Lieb, chairman of the committee on gas and electric service. At a meeting of the committee held on July 9th, Mr. Guffey was chosen as chairman, John G. Pew, vice-chairman, and David O. Holbrook as secretary of the committee.

Who Now Owns the Buffalo Gas Co.?

The Buffalo Gas Co. bondholders' protective committee, has sold about $5,500,000 of the $6,000,000 bonds outstanding to L. H. Gethofer, president of the Pittsburgh Trust Co., and associates, at 40. The property has been foreclosed and the entire control is in the hands of Mr. Gethofer and his associates. The situation at Buffalo is complex in that the Buffalo Gas Co. with valuable franchise rights, subject to competition with the Buffalo Natural Gas Co., has been unable to make a profit on its operations owing to excessive fuel costs, but at the same time its life is sustained by the recurring natural gas shortage in the winter so that it is kept in operating by the limitations of the natural gas supply. As the Buffalo Gas Co. has been an independent concern, some curiosity is being expressed in Wall Street as to what interests Mr. Gethofer represents. A banker who has been identified with the bondholders' protective committee said that it was not known just what interests were represented by Mr. Gethofer, at the same time expressing the opinion that the bondholders had obtained a very satisfactory price at 40.

The Hope Natural Gas Co. is building a gasoline plant on the farm of Charles Scranage, near Pruntytown, W. Va. Several months ago the company drilled a well on this farm, but the production was so small that it was scarcely worth marketing, and it was decided to manufacture gasoline. The oil is said to be exceptionally fine for gasoline.

Meters May Be Required To Prevent Natural Gas Waste.

In the case of the Pawhuska Oil & Gas Co., the Oklahoma commission rules that the commission can change rates fixed by municipal franchise; 2. The commission can require the installation of natural gas meters under statutory authority (Laws of 1913, chap. 93, secs. 2, 3) to fix rates, to prescribe rules and regulations, and to use power necessary to perform enumerated or indicated powers, and, where the gas is obtained by a lease of the land of Indians, under a regulation of the Secretary of the Interior, that the gas shall be metered and sold at meter rates; 3. A natural gas company will be required to install meters where the use will prevent waste, eliminate discrimination, and increase the net earnings; 4. The rate-making value of a natural-gas lease depends upon the amount of gas produced; 5. The going value of a utility will be recognized in the total valuation, although a separate allowance for the item will not be made; 6. The sum of $3,000 is a sufficient allowance for working capital for a natural-gas producing and distributing system having a total rate-making value of $57,505.64; 7. Two cents per 1,000 cubic feet is not an excessive allowance in a rate case for the cost of producing natural gas in a rapidly declining field; 8. Values, revenues, and expenses of a natural-gas producing system were apportioned between distributing systems on the basis of the sales to each system; 9. An allowance of 20 per cent. for shrinkage of natural gas sold without metering was made in a rate case pending a test to be made after the installation of meters; 10. All industries should be charged the same rate per 1,000 feet for natural gas; 11. The furnishing of natural gas free to a city and city buildings may be permitted to continue until it is found to be inequitable to other consumers or conducive to waste, where the amount is small and free gas was an inducement held out to the city for granting a franchise, although such franchise provision is not binding on the commission; 12. Preference should be given to domestic consumers of natural gas if the supply is insufficient for all classes; 13. A natural gas company may require a deposit from all consumers equal to the estimated consumption for forty-five days; 14. A natural gas company may cut off service from a consumer who fails to pay his bill within fifteen days from its rendition.

Beverly Hills Gas Plant Sold to So. California Gas Co.

The Beverly Hills Utilities Co. has been authorized to transfer and convey to Southern California Gas Co. its gas distributing system for the sum of $18,500, plus the cost of additions and extensions subsequent to December 1, 1916, and the value of materials and supplies on hand when the property is transferred.

LOUISVILLE'S SUPPLY.

Manager McDonald Issues Statement Asking Investigation of Gas Demands.

In regard to the threatened shortage of natural gas in Louisville, Ky., the coming winter, General Manager Donald McDonald, of the Louisville Gas & Electric Co., has issued the following statement:

"The Louisville Gas & Electric Co. has not threatened to raise its rates, nor has it asked for the privilege of making artificial gas. It has simply notified the city that in all human probability the supply during the coming winter will not be great enough to meet the demands of the consumers in this city, and has asked the city to investigate whether or not this apprehension is well founded, and if the city finds it well founded, that it fix a fair rate at which the natural gas supply shall be supplemented with artificial gas.

"Whatever is necessary to be done the company stands willing and ready to do. All that we ask the city to do is to commence its investigation promptly and to make it thorough."

Doherty and Armour Oil Interests Merge.

A merger of the oil interests of the syndicate headed by J. Ogden Armour, of Chicago, with those controlled by Henry L. Doherty & Co., of New York, was announced July 19. The Doherty organization recently purchased the distributing plants of the Venture Gas Co. in Nevada, Morrell and Wyandotte, O.

The gasoline station at the Mansfield, Ohio, compressor plant has been completed and is working to good advantage, yielding about 600 to 1,000 gallons a day. A contract was made not long ago with the Standard Oil Co to dispose of the product.

Near Utica, O., there is in process of construction a gasoline extracting plant capable of handling 2,000,000 cubic feet.

A new compressor station is being built at Union, O., which will be run by gas engines instead of steam-driven engines. The Hebron plant will be discontinued on the completion of the one at Union. A plant for extracting gasoline from natural gas will also be constructed at Union.

President C. S. Forney, of the California Gas Co., has announced the purchase of a site for a new auxiliary plant to be erected at Porterville, Cal., through which natural gas will be furnished to local consumers. Mr. Forney states that two gas holders, one of 245,000 foot capacity and one to hold 1,000,000 feet, will soon be erected. A petition asking the state railroad commission for authority to put in a system for bringing natural gas from the oil fields is now pending.

FIELD OF FINANCE

Big Earnings of Massachusetts Gas Cos.—Officers Elected.

Earnings of subsidiary companies of Massachusetts Gas Cos. (not including New England Manufacturing Co. munitions plant nor J. B. B. Coal Co.) for June were $479,552, which is $102,969 (27.34 per cent.) larger than any prior month and $174,726, or 57.22 per cent., over June, 1916. James L. Richards was elected president of Massachusetts Gas Co. to succeed Mr. Weld, who was elected chairman of trustees. Mr. Richards was also elected chairman of Boston Consolidated Gas Co., East Boston Gas Co., Newton & Watertown Gas Light Co. and Citizens' Gas Light Co. of Quincy.

Memphis Gas and Electric Companies Merge.

The Memphis (Tenn.) Consolidated Gas & Electric Co. and the Merchants Power Co. will go out of business and a new corporation, which will be known as the Memphis Gas & Electric Co., will take over their real estate, assets and liabilities. This new concern is formed under the stipulations of the agreement made last fall when the price of gas and electricity was reduced. Some of the officers of the old company remain with the new company. Others do not.

The president of the new company is William M. Flook. L. G. Van Ness will be the senior vice-president of the new company and the resident directing officer. Another vice-president will be C. K. Stieg. J. F. Ramier will be the general manager. The other officers will be as follows: V. A. Henderson, secretary; J. W. Clapp, treasurer; C. K. Chapin, assistant secretary, and Frank Jones, assistant treasurer.

New Jersey Companies Allowed To Merge.

Consolidation of a number of gas companies in Cumberland county, New Jersey, under the new name of the Cumberland County Gas Co., has been approved by the public utility commission. Under date of April 10th, petition was submitted to the board for its approval of the consolidation of the Millville Gas Co., Citizens Gas Co., of Landis Township, Citizens Gas Co., of Vineland, Commercial Gas Co., Maurice River Gas Co., Downe Township Gas Co., Lawrence Gas Co., Fairfield Gas Co., Deerfield Gas Co., Pittsgrove Gas Co., all of Cumberland county.

Earnings of Western States Gas & Electric Co.

Gross earnings of the Western States Gas & Electric Co. for the month of June show an increase of 13.8 per cent. over June, 1916. Comparative figures for the month and the year ended June 30 are given below:

Month of June	1917	1916	Increase
Gross earnings	$ 115,149	$ 101,165	$13,984
Net earnings	54,983	52,397	2,586
Year ended June 30			
Gross earnings	$1,309,208	$1,215,870	$93,338
Net earnings	622,771	585,562	37,209

Ohio Cities Gas Co. Dividend On New Stock.

Ohio Cities Gas has declared a cash dividend of $1.25 per share on the new stock "when issued," payable September 1st. This is equivalent to 5 per cent. for the quarter on the new stock "when issued," par $25. Holders of old stock of course receive this dividend and also on the new stock if they have subscribed.

Cambridge City System Now Is Owned by Two Indiana Men.

The Cambridge City (Ind.) natural gas plant, with its equipment, franchises and other rights, has become the property of A. B. Ayres, of Fortville, and F. M. Millikan, of Indianapolis. The plant started in 1897, supplies Cambridge City, Milton, East Germantown, Mt. Auburn, Dublin, Straughn, Mays and Raleigh with gas. It includes forty wells, sixty miles of pipe line and 1,200 consumers. Mr. Ayres is president of the new organization; Sherman Strong, vice-president, and Mr. Millikan, secretary-treasurer.

Fidelity Gas Co., of Hoosick Falls, N. Y. To Be Sold.

John W. Roddy, of Troy, N. Y., has been appointed referee to sell the plant of the Fidelity Gas Co., of Hoosick Falls, in foreclosure of a $75,000 mortgage. Considerable construction work will have to be done to the plant and improvements will have to be made to the distribution system.

Appleby & Wagner of Saginaw, Mich. have sold their interests in the Iowa Public Service Co., of Ames, Ia., to I. C. Tenney, president of the American Gas Construction Co.

LEGAL DECISIONS

Gas Lease.

Where a gas lease provides a graded scale of royalties, based on minute pressure of the gas, which scale contains a minimum pressure, and the lease is silent as to the use of gas or payment therefor while pressure is below the minimum, the lessor is not entitled to recover payment for gas produced below the minimum pressure and marketed by the lessee.—Addleman v. Manufacturers Light & Heat Co., Supreme Court of Pennsylvania, 100 Atlantic, 446.

Gas Gain Across River.

The right to improve the navigability of a stream is paramount to the rights of a gas company, given permission by proper authority to lay its pipes in the bottom of the stream, and a dredge employed in such improvement can be held liable for an injury to the company's pipes only on the ground of negligence.—The No. 6, U. S. Circuit Court of Appeals, 241 Federal, 69.

Laying of Gas Pipes.

Act May 29, 1885 (P. L. 34) § 12, conferring the right of eminent domain upon gas companies, and providing that where any dispute arises between them and the authorities of any town in the highways of which its pipes are laid, the court of common pleas, on petition of either party, may define the precautions, if any, to be taken in the laying of pipes, contemplates that township authorities, where a question of public safety or convenience is involved should have a voice as to the character of the pipes and the method of laying them.—Vernon Tp. v. United Natural Gas Co., Supreme Court of Pennsylvania, 100 Atlantic, 1007.

Rates.

The enforcement of an order of a public service commission fixing water rates upon the basis of a net return of 10 per cent. on the value of the property employed after deducting an annual depreciation charge of 3½ per cent. should not be enjoined by the courts as confiscatory upon contradictory affidavits dealing with the items of value which go to make up the water system, where it cannot be said that it was impossible for a fair-minded board to come to the result which was reached.—Van Dyke v. Geary, Supreme Court of the United States, 37 Sup. Ct. Rep., 483.

Contract To Purchase Gas.

The rights of one who had contracted to purchase certain gas, but refused to accept that which was tendered on the ground that it did not conform to the requirements, held not to be affected by his refusal to sign a writing authorizing the seller to dispose of it elsewhere.—Ely v. Wichita Natural Gas Co., Supreme Court of Kansas, 165 Pacific, 284.

NEW PRODUCTS

WHO IS "LIBERTY GLOW?"

Ohio State Stove Co., of Columbus, Answers the Query in Announcement.

An interesting sidelight on a big and successful publicity feature that has been recently presented to the gas industry is furnished in the announcement that the already famous "Liberty Glow," of Columbus, Ohio, is a division of the well known Ohio State Stove Co., probably the oldest and one of the largest manufacturers of room heaters in the country. This enterprising firm devised the "Liberty Glow" fireplace heater, it is stated, when the high price of coal throughout the country made it imperative that the gas companies should supply their consumers with an appliance to supplant the old fireplace, an appliance moderate in price, efficient and economical in operation, and easy to install. In order to test out the actual need of such an appliance, the company decided to put it out strictly on its merits, without the benefit of the company name and influence to help it along. Hence it has been advertised simply as "Liberty Glow, Columbus, O."

A highly satisfactory result has been obtained and the manufacturers convinced now by orders and inquiries received that the merits of the "Liberty Glow" are known and appreciated by the entire gas industry, and that there is a pressing need among American householders for just such an appliance, announce their sponsorship for "Liberty Glow." Hereafter, it is stated, the appliance will be advertised and marketed from the Liberty Glow Division, Ohio State Stove Co. The test having amply justified their estimates as to the real worth of the appliance, without influence or prestige of the manufacturer being brought to bear, there is no longer any reason for withholding any such information that the industry may have been wanting, they say.

Another big success, therefore, is to be added to the long list of gas appliances supplied to the industry by the conservative "Ossco" concern. Further information concerning the "Liberty Glow" heater may be had on request of Liberty Glow Division, Ohio State Stove Co., Columbus, O.

Ingersoll-Rand Has New Catalogs Ready for Distribution.

The Ingersoll-Rand Co., 11 Broadway, New York, has the following new catalogs ready for distribution:

Form 8006—20-page catalog on Imperial motor hoists and stationary motors.

Form 8212—4-page bulletin on Crown Coal Pick and Core Breaker.

Form 8213—16-page booklet on "Little David" Pneumatic Chipping, Calking and Scaling Hammers.

Form 9102—8-page bulletin on Air Receivers, Pressure Tanks and Moisture Traps.

These catalogs are profusely illustrated and show tables of sizes and capacities.

Common Draft Troubles and Their Remedies.

Momentary draft troubles are common and are apt to occur in every chimney, smothering out the gas flame. These are caused by wind currents coming from different directions at the same time. Common draft troubles and their remedies are illustrated and described clearly and concisely in a blue print issued by the Lezius Automatic Draft Regulator Co., Cleveland, O. This chart will be of considerable value to the commercial department of every gas company. A copy will be sent by the Lezius company on request.

Attractive New Heaters Announced by Ringen Stove Co.

The "Quick Comfort" gas heater line of the Ringen Stove Co., div. has several noteworthy heaters this year. One of the new appliances is illustrated here. This heater has an asbestos back, a bunsen burner and a copper reflector. An incandescent fuel box is

"Quick Comfort" Gas Heater.

supplied for natural gas. An ingenious method of circulation is employed. Full details of the various models will be sent on request by the Ringen Stove Co., div., St. Louis, Mo.

Hale Gas Mixers Used in Army Cantonments.

The Hale Gas Mixer is "doing its bit" in army cantonments. The Meek Oven Manufacturing Co. has made several installations of bake ovens equipped with the Hale mixer and the Cass-Smurr-Damerel Co., of Los Angeles, has made a large installation of gas ranges in the California cantonments, all of these ranges being equipped with Hale mixers by specification.

The Improved Equipment Co., 445 Kent Street, Brooklyn, N. Y., has issued bulletin 360 featuring its line of bake ovens. A copy will be sent on request.

Reclaiming Broken Machinery By Oxy-Acetylene Welding.

That practically every piece of this metal equipment, which manufacturers have discarded as junk, can be restored to service quickly and at a trifling cost by oxy-acetylene welding is the subject of a nation wide campaign being conducted by the Prest-O-Lite Co., Inc., of Indianapolis, Ind. The campaign, which is being run in general and technical magazines, points out the possibilities of the Prest-O-Lite process of oxy-acetylene welding and cutting in the conservation of time, metals and labor by reclaiming the scrap-pile. Aside from a strong dollars and cents appeal to progressive manufacturers, the campaign points out a way of avoiding costly delays incident to getting new equipment and of helping the national conservation movement.

The practice of reclaiming broken and worn metal parts by oxy-acetylene welding, as well as applying the process to manufacturing metal products is, of course, not new. The process has been in extensive use in thousands of mines, mills, foundries and factories for some years. In these days of high-priced metals and uncertain deliveries, however, the process must hold some interest for every far-sighted manufacturer who has not heretofore looked into the possibilities.

Pipe Bending Machine Described in New Folder.

American Pipe Bending Machine Co., Boston, Mass., manufacturer of the "Wonder" pipe bender of several different models, recently issued a folder, illustrating these machines, and calling attention to conspicuous work performed by them. Especial attention is called to the new buildings of Massachusetts Institute of Technology, in which the miles of pipe used were bent by Wonder pipe benders. The bending of steel, iron, brass and copper pipe, without cracking, crimping or weakening is regarded one of the difficult problems in pipe-fitting, and this was accomplished in the buildings named to the satisfaction of Stone & Webster Engineering Corp., by which they were constructed. By use of this machine the pipe is bent cold, without treating or filling.

Portable Wagon and Truck Loaders.

The advantages of Brown-Portable wagon and truck loaders for handling loose material such as coal, coke, etc., are presented in bulletin 20, issued by the Brown Portable Elevator Co., Chicago.

"Solvay Alkali" is the title of a new illustrated booklet recently issued by the Solvay Process Co., Syracuse, N. Y., presenting the various forms and uses of alkali with notes on alkalimetry and chemical and commercial tables conveniently arranged for the use of the consumer. A copy of this publication will be sent by the company on request.

Youngstown Sheet & Tube Co. Make Big Extensions.

Extensions of its by-product coke and benzol recovery plants have been authorized by the Youngstown Sheet & Tube Co., increasing the output of the plants 50 per cent. and entailing an expenditure of about $3,000,000. To the present 204 coke ovens, 104 ovens will be added. The extended plant will produce about 4,000 tons of coke daily. The improvements are to be completed within a year.

Gas and Air Compressors of Chicago Pneumatic Tool Co.

Gas and gasoline driven air compressors are covered in a 24-page bulletin, by the Chicago Pneumatic Tool Co., Chicago. These compressors are of the horizontal, straight-line, single-stage, double-fly wheel, inclosed-frame type. Cast iron sub bases, oak skids or portable tanks are furnished as desired. Splash lubrication, employed for the main bearings, crosshead guides, wrist pin and crank pin are said to make the compressor practically self oiling. The power cylinder is of the valveless, two-cycle type, close regulation being secured by means of a fly ball governor, which regulates the gas and air admitted in accordance with the load demand. Thorough scavenging of the cylinder is provided for by a deflector on the piston.

J. T. Wilkin President of Connersville Blower Co.

The Connersville Bliower Co., Connersville, Ind., owing to the recent death of E. W. Ansted, president of the company, has named J. T. Wilkin, president, and R. T. Huston, vice president. Mr. Wilkin, formerly vice president of the company, is an engineer of long experience. The directors now consist of J. T. Wilkin, J. E. Huston, R. T. Huston, C. D. Beck, G. W. Ansted, J. S. Tatman and F. B. Ansted. The Connersville Blower Co. was established in 1893.

McJunkin hands out some "hot" advertising material in the co-op gas service for August. The canning ad illustrations abound and there are many hot water heater, incinerator and other gas appliance views "that adorn a tale and point a moral." There are several fine form letter suggestions, a colored window card and another issue of the "McJunkin Gas Service Bulletin." The McJunkin Co. offers some tempting inducements for the gas men who turn in the best window trimming and sales ideas for use in this bulletin. The McJunkin Agency, 5 South Wabash Avenue, Chicago, will send samples of its August service to interested gas men.

George M. Clark & Co., div. has a good piece of range advertising material in the shape of a folder for builders, architects and landlords. This folder illustrates some of the notable apartment buildings in which Clark Jewel all-steel ranges have been installed. This folder will be valuable to the commercial manager who wants to cover all these prospects in his territory.

GAS ENGINE DEMAND.

National Transit Co. Reports Activity in Business All Over the Country.

Several interesting new developments are reported from the National Transit Company's offices in Oil City, Pa., as characteristic of the last few months in gas and oil engine business. Among them are the growing demand for gas engines of small horsepower and the noticeable activity in shipbuilding interests, as well as the employment of women in positions from which they have been hitherto excluded.

Shipbuilding interests are buying much machinery of the National Transit, their line being the most active at the present time. Within the last few days an order for $10,000 and one for $8,000 worth of pumps have been received. Natural gas companies are now demanding gas engines of smaller sizes than formerly. They are now going back into the country for wells producing only 500,000 feet and pumping this small production into pipe lines, where of old they would have ignored such small quantities completely. All natural gas is now being put through absorbers for the extraction of gasoline, the companies thus being able to make a substantial profit on production to which they formerly paid no attention. The National Transit has a number of orders for engines of 50 to 165 h. p. for fall delivery to be used in the gasoline making industries of West Virginia. This demand for engines of comparatively small horsepower is one of the most interesting developments in the gas and oil industry.

At the meeting of the West Virginia Natural Gas Association held recently in Parkersburg, the company had a 50 h. p. gas engine with direct connected compressor on exhibit. As the engine was kept running, it drew a great deal of attention, most of the other exhibits being of packings, pipe and the like. The engine on display was one of an order of three just completed for the Clarksburg station of the Hope Natural Gas Co., who allowed the use of one engine for the exhibit.

Large orders nearing completion are one of 10 150 h. p. oil engines for use in Yucatan, and one for 16 duplex power pumps for the Cudahy Sinclair Co. Permission has been granted, on account of the lack of ready steel, to hold up the filling of a big order for the Sinclair Gulf Pipe Line, but the company expects to complete the work on schedule time. At a meeting of all the salesmen of the company recently business conditions were reported good all over the country in spite of the fact that deliveries cannot now be promised under eight or ten months.

Asbestos Protected Metal Co. Closes Cincinnati Office.

The Asbestos Protected Metal Co., of Pittsburgh, announces the temporary closing of its Cincinnati office on August 1, 1917, due to the fact that E. G. Irwin, Cincinnati manager, has entered the Ohio National Guard. Communications addressed to the home office, First National Bank Building, Pittsburgh, will receive immediate attention.

MARKET PRICES.

Phenol, Benzol and Toluol in Great Demand—Government a Big Pipe Buyer.

Extensive sales of phenol and benzol feature the coal tar products market. These sales have caused a comparative scarcity of spot phenol and prices are higher, spot being quoted at 40 to 45 cents per pound at producers' plants, while the contract market is nominal. Sales of benzol involve spot principally and include both domestic and foreign makers of picric acid. Pure benzol continues at 55 to 60 cents per gallon at producers' plant, both spot and contract. Large quantities of toluol for next year are wanted by the trinitrotoluol makers, but output is so sold ahead that it is difficult to accommodate the new business and there is much discussion of methods to make up the shortage. While material increase in the production of toluol would be difficult and would require time, benzol could be employed for making much more picric acid than at present. Solvent naphtha is slow at 18 to 25 cents per gallon at producers' plant, spot, and at 18 to 22 cents, contract. A few carload sales of sulphate of ammonia recently were sold, spot, at $4.85 to $5 per 100 pounds at seaboard.

Cast Iron Pipe.

The government's requirements for army camps are the feature of the cast iron pipe market. Tonnage for this purpose is larger than had been expected, although in many cases wooden pipe is being used, as it is cheaper and can be obtained at once. One result of the heavy government demand is that stocks of small sizes at foundries have been drained to furnish prompt delivery. The government recently took pipe manufactured for the cities of Chicago and Cleveland to fill its pressing needs. A shipment of cast iron pipe is being rushed from Birmingham plants to Montgomery, Ala., for extension of the water works there to the new cantonment. Hattiesburg, Miss., is to get another camp and soon will place orders for cast iron pipe and sanitary pipe in that district.

Demand for Fire Clay Products.

Demand for fire clay products is heavier than it has been at any time in the history of the industry. Deliveries generally are becoming more deferred, some makers being unable to promise shipments in less than six months. Several concerns are asking $55 as a minimum on Pennsylvania fire clay brick of first quality. Quotations on silica brick in the Pennsylvania, Chicago and Birmingham districts are unchanged; they range from $45 at Birmingham to $55.50 at Chicago, as a minimum.

Handbook on Shepard Hoists Ready for Distribution.

"Hoisting Machinery for Industrial Works" is the subject of a new handbook issued by the Shepard Electric Crane & Hoist Co., Montour Falls, N. Y. A wealth of hoist data is presented, supplemented by cuts showing different types of hoists for various purposes. A copy of this valuable publication will be sent by the manufacturer on request.

RECENT PATENTS

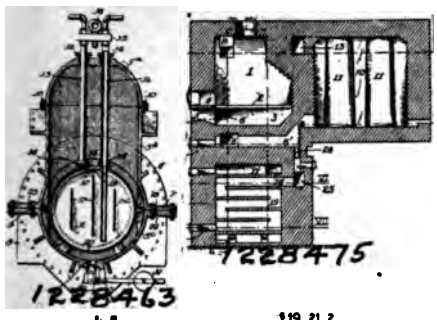
By R. S. McBride, U. S. Bureau of Standards

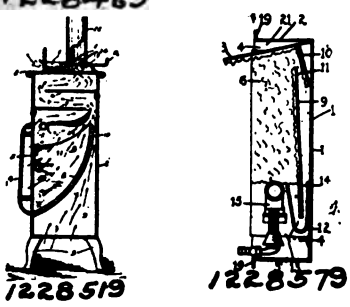
Patents on subjects of interest in the gas industry were granted on the dates indicated. The page in the Official Gazette of the United States Patent Office of these dates is shown in parenthesis for each patent. Numbers marked thus (*) are illustrated. Printed copies of patents are furnished at 5 cents each by Commissioner of Patents, Washington, D. C.

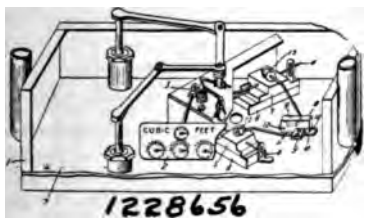
Granted June 5, 1917.

1,228,463.* HOT-BLAST VALVE. Walther Mathesius, Chicago. In a gate valve, the combination of a pair of annular parallel valve seats, a valve for co-operation therewith, a stem supporting the valve through the casing whereby the valve is permitted to swing between the seat members with the point of support as a center, the valve being tapered so as to engage every portion of either seat member when swung thereagainst.

1,228,467. GAS-METER ATTACHMENT. Henry C. Morris, Dallas, Tex. In a gas-meter attachment, the combination with







the valve case of the meter having an inflow pipe, of a normally open valve for said pipe, and means capable of tilting in opposite directions, maintained in an inoperative position when the meter is in its normal upright position, for closing said valve when the meter is tilted in neither of said opposite directions from its upright position.

1,228,475.* VERTICAL BENCH. Pierre Plantiga, Cleveland, Ohio. In a vertical bench, in combination, a gas producer, an oven adjacent thereto, a recuperator below the producer and oven, a gas conduit leading from the upper part of the producer to the lower part of the oven, a secondary air supply means leading through the recuperator to said gas conduit and discharging in the vicinity below the level of the oven, and a conduit leading from the upper part of the oven downward through the wall of the producer and through the recuperator to heat the air passing through the recuperator.

1,228,519.* STOVE. Henry A. Baxter, Mansfield, Ohio, assignor to New Method Stove Co., Mansfield, Ohio.

1,228,579.* STOVE. Simon N. Mentel, Mary A. Mentel, and George E. Mentel, Springfield, Ohio. A flueless space heater.

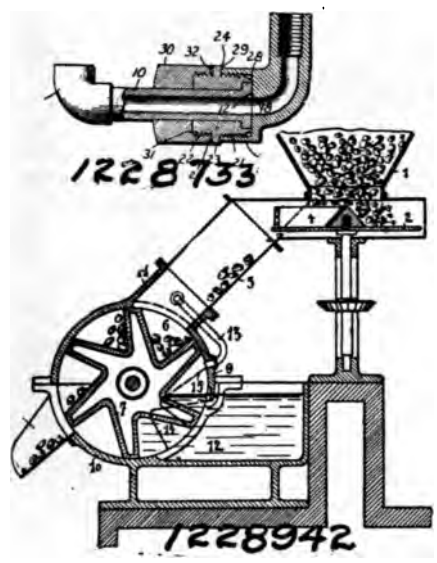
1,228,632. FEEDING AND BURNING FINE FUEL. Walter D. Wood and Henry G. Barnhurst, Allentown, Pa., assignor to Fuel Saving Co., Allentown. A stoking apparatus.

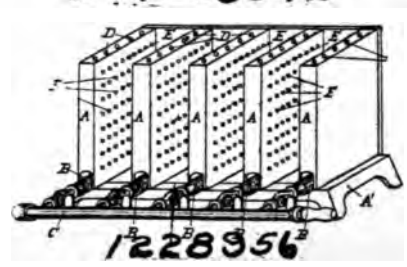
1,228,656.* GAS METER VALVE PROTECTOR. Bennett Emerson and Henry C. Morris, Dallas, Texas; said Emerson assignor to said Morris.

1,228,733.* PIPE-COUPLING. Henry Aebli, Portland, Ore.

1,228,769. APPARATUS FOR BURNING POWDERED COAL. Aubrey J. Grindle, Chicago, assignor to Combustion Economy Corp'n, Chicago.

1,288,879. MANUFACTURE OF GAS. Julius Bueb, Dessau, Germany. The process of making gas, consisting in distilling coal in a vertical retort, maintaining said retort at a temperature above the disintegration point of fire-clay and approximating the melting point of silica, admitting water vapor into the vertical retort toward the end of the distillation thereby generating water gas and reacting with water gas on the tar remaining in the coke.



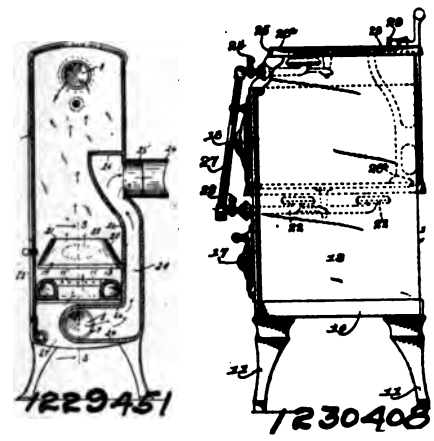


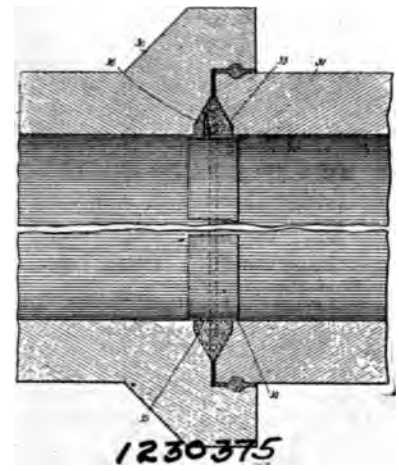
1,228,942.* RETORT DISCHARGER. George Merkel, Munich, Germany.

1,228,956.* GAS COOKER. Joseph Henry Noonan, Auckland, New Zealand.

1,229,038. GAS PRESSURE REGULATING AND MIXING VALVE. Clyde Cornelius, Pittsburgh. A device to regulate the primary air supply.

1,229,042. PROCESS FOR IMPROVING THE QUALITY AND YIELD OF HYDROCARBON GASES. James Grant Davidson and Robert William Ford, Vancouver, B. C., Canada. The process of treating a gas containing hydrocarbons which consists in subjecting it to the action of a high tension silent electrical discharge, in such





manner as to convert hydrocarbon constituents in the gas into constituents of less molecular weight and less condensability, the energy required for such conversion of the hydrocarbon constituents being derived directly from the electrical discharge.

1,229,098. PROCESS AND APPARATUS FOR THE CONVERSION OF HEAVY HYDROCARBONS INTO LIGHTER HYDROCARBONS. Frederick Lamplough, London, England. The process of converting the heavier constituents of petroleum into lighter constituents which consists in passing said heavier constituents in the state of vapor together with steam, under pressure and at a temperature indicated at a low red

heat over and in contact with nickel in compact extended form.

Granted June 12, 1917.

1,229,336. METHOD OF PRODUCING FUEL-GAS. Max Sklovsky, Moline, Ill., assignor to Deere & Co., Moline, Ill. The method of producing a gaseous fuel, which consists in heating air to a temperature of more than 500° F., and introducing fuel oil into and thoroughly mixing it with the heated air, meanwhile causing the stream of air to flow at a velocity greater than the speed of travel of ignition back along the advancing stream of the mixture.

1,229,451.* GAS HEAT RADIATOR. August J. Hartfield, Los Angeles, Cal., assignor to Helen A. Hartfield, Los Angeles, Cal. A ventilating gas heat radiator comprising a central burner section having a partition wall dividing the same into a combustion chamber and a waste gas offtake flue.

1,229,742. SELF STOVE LIGHTER OR PILOT LIGHT. Charles L. Gisler, Sisterville, W. Va.

1,229,805. FLUID FLOW METER. Wilbur W. Stevenson, Wilkinsburg, Pa., assignor to Westinghouse Electric & Manufacturing Co. A recording pitot tube device.

1,229,842. SELF-DRAINING ATTACHMENT FOR GAS METERS. Henry P. Westcott, Erie, Pa. The combination with a gas meter having a drain opening in a wall thereof, of a self-draining attachment for a condensed product comprising transmitting absorbing elements applied in operative relation to opposite sides of the wall adjacent to and around the said drain opening.

1,229,886. SYNTHETIC PRODUCTION OF HYDROCARBON COMPOUNDS. Louis Bond Cherry, Kansas City, Mo. The method of causing rearrangement of the molecular structures of liquid hydrocarbon compounds to produce a product of the same series but of different gravity and boiling point by subjecting such compounds while in a vaporized state to the silent discharge of a high frequency oscillating bipolar electric current or its equivalent, substantially as described.

1,230,087. MANUFACTURE OF TOLUOL. Owen Brooke Evans, Philadelphia, assignor to the United Gas Improvement Co., Philadelphia. The process of manufacturing toluol which consists in preheating a checker-brick chamber by internal combustion to a temperature sufficiently high to materially increase the percentage of toluol, subjecting naphtha of gas drip origin substantially as herein described to the heat of said chamber thereby forming a gas carrying toluol vapor, leading the gas and toluol vapor from the chamber, and recovering the toluol, substantially as described.

Granted June 12, 1917.

1,230,226. PROCESS OF MANUFACTURING COMBUSTIBLE FLUIDS. James R. Rose, Edgeworth, Pa. The oil is cracked in an atmosphere of hydrogen.

1,230,375.* PIPE JOINT. Howard E. Burns, Chicago, assignor to C. F. Massey Co., Chicago.

1,230,408.* GAS RANGE. Harry W. Hunter and Martin W. Longfellow, Baltimore, assignors to the Baltimore Gas Appliance & Manufacturing Co., Baltimore. An improved gas range comprising a body provided with superposed baking and broiling ovens a cooking top located above the uppermost oven and spaced therefrom, said cooking top being provided with inwardly beveled peripheral portions and a heating portion, burners located in the space between said cooking top and the ovens.

1,230,583. PRESSURE CORRECTING METER. Alfred G. Kollstede, New York, assignor to Rotary Meter Co.

1,230,782. METHOD OF DISTILLING COAL-TAR OR COAL-TAR PITCH AND PRODUCTS DERIVED THEREFROM. Peter C. Reilly, Indianapolis. The method of producing a dry coke from coal-tar pitch and likewise producing an orange-colored mass waxy at 70° F. and a hard, garnet-colored mass brittle at 70° F., which consists in subjecting the coal tar or coal-tar pitch to a temperature of substantially 1,000° F. in a still subjected to a substantially even temperature over its entire surface

1,230,808. CONNECTION FOR GAS MAINS. Samuel B. Sheldon and Kinney C. Hoxie, Duluth, Minn. In a gas plant, the combination of adjacent gas (hydraulic) mains, upwardly-extending bell connections on said mains, said mains provided with valve seats within said bell connections, valves acting within said bell connections and adapted to co-operate with said seats, an inverted substantially U-shaped pipe joining said bell connections and adapted to form spigot joints therewith, said pipe provided with an opening permitting inspection and cleaning.

ENGINEERING STUDENTS.

The War Department's Recognition of the Need for Technical Engineers.

Never in the history of this country has there been so great a demand for men having technical training in engineering as at present. The war in Europe has been a war of engineers and of the product of engineers, and every effort has been made by the European powers to conserve and increase the supply of men who are competent to carry on the work of the industries upon which the success of the war depends. For the past few years the demand for graduates of engineering schools in this country has been far in excess of the supply, and many of the most important industries have been seriously embarrassed in consequence of this condition. Some of the great industries of America have already made inquiries concerning the possibility of the employment of women in certain branches of engineering work which heretofore have been open only to men.

Many persons who are in a position to appreciate the need for engineers in the prosecution of the war and in the preparation for times of peace which will follow have been concerned over the possibility that the number of students preparing themselves for engineering careers might be decreased as a result of war-time conditions and the action of the draft. In recognition of this possibility, P. P. Claxton, United States commissioner of education, under the authorization of the secretary of war, has addressed a letter to the presidents of the various technical schools and colleges of the United States, as follows:

"The successful prosecution of the war depends in large degree on the services of scientific and technical experts. It is of the utmost importance that the supply of men who have had advanced technical training should not be cut off more than is necessary. In view of this fact, the war department believes that students in technical schools and colleges who are within the age limits of the selective draft should be treated in the same manner as the workers in the industries which are devoted to the manufacture of war materials. Under this ruling the presidents of colleges and technical schools may properly urge the district exemption boards to exempt students in their institutions who give promise of special aptitude for the technical and scientific professions until these students have finished their courses. It is expected that institutional officers will exercise due caution and will not claim exemption for students whose success in technical careers is open to doubt.

"It should be clearly understood that each case is to be considered by the district exemption boards on its own merits. Students in technical schools are in nowise exempt as a class. No classes of persons are exempt from the operation of the selective draft except those specified in the act. I am bringing this matter to your attention with the authorization of the secretary of war."

No Changes in Steel Pipe Since April 2nd.

Manufacturers of tubular products are co-operating effectively with the government, supplying materials for cantonments, steel beds and marine boilers. Despite the sold-up condition of the mills, government work is being rushed with the greatest possible dispatch. The domestic market is quiet. Specifications against contracts are heavy, but no large contracts have been placed recently. Generally, mills cannot promise deliveries before the latter part of the year. The National Tube Co. and two other independent makers have made no changes in prices since April 2, last. Several independent mills, however, are quoting standard steel pipe at about $25 a ton above the price of the leading interest.

Italy Wants Catalogues of American Manufacturers.

The American Chamber of Commerce for Italy, located at Via Victor Hugo No. 4, Milan, desires catalogues and price lists from American firms relating to all kinds of goods. This organization, which was formed over two years ago, now has a membership of over 500 and is doing a great work in promoting trade relations with the United States.

Pyrometer Catalogue Issued by Hoskins Mfg. Co., Detroit.

The Hoskins Manufacturing Co., Detroit, Mich., has issued Bulletin 3-A, describing Hoskins pyrometers, which are coming to be extensively used in the gas field.

The GAS RECORD

PUBLISHED THE SECOND AND FOURTH WEDNESDAY OF EACH MONTH
THE GAS PUBLISHING CO., MONADNOCK BLOCK, CHICAGO

Vol. 12, No. 4. CHICAGO, AUGUST 22, 1917 $2.00 a Year

The Supremacy of Gas Light

Chicago Business and Professional Men in All Lines Openly and Enthusiastically Declare for It After Long and Patient Tryout of Other Methods

By Milt Saul

It requires no new evidence of any kind to convince me that gas lighting is superior in every respect to any other form of illumination. I was convinced of that fact nearly ten years ago, down in Georgia, and each development of the modern gas light that has come under my observation since that time served only to strengthen my convictions on that subject. Jim Rushin did the original work of settling all my doubts about gas lighting, and he made a complete job of it. It was back in the dark, lean days when a majority of gas company officials and employes urged gas lighting on prospective customers, but illuminated their own homes with electricity. Rushin was commercial manager for a gas company and I was advertising manager.

"You might devote some of our space in the newspapers to gas lamps," said Jim one day, when I called at his desk for seasonable subjects for advertising. "We have sold about everything else we had in stock."

I had just concluded a little newspaper campaign on wiring homes for electricity for the combination company we worked for, and the advantages of electric lighting I had presented to our community were still vivid in my mind. So I shook my head.

"Let's talk about something else," I suggested. "I haven't got the nerve to urge gas lamps on this town when electric lights are available."

I was rather new in the gas business at the time. But so was the modern gas light then, for that matter. Jim, however, had come up the line from a fitter's job, and had kept up with every development in the industry. He got peeved at me for my indifference to-

C. A. Luther.

ward the new gas lamps, with which he had loaded up the company's stock room. A day or two later a rumor went around the building that the gas department wasn't satisfied with my services, and I was liable to lose my jos, so I knew Jim was peeved. I think now he went so far as to get sore. Anyhow, his Georgia "cracker" blood welled up into his countenance. He got up from his chair.

"Have you ever seen a gas light with a mantle on it?" he demanded.

Our Lone Gas Light.

"Oh, yes. There's one in our kitchen," says I, "but the mantle's broken and all blacked up, and it doesn't give much light, even when it is lighted, which isn't often. The cook wants me to get a lantern, so she can find it, and turn it off when the work's all done."

"You ain't got no education, nohow," Jim replied, with characteristic regard for grammar, "but darned if I don't educate you on this subject, if it's the last act o' my life."

Then he grabbed up his hat and went away from there.

When I got home that night I discovered where he went. He had invaded my "den" and installed a portable gas lamp there. It was one of the early inverted mantle type, that made a noise like a sewing machine when it got warmed to its work. Rushin had placed it on a table, directly beneath the electric fixture containing three bulbs. After dark I touched it off with a match, and after viewing it a minute or two I turned on the electric bulbs—all three of them. That little gas lamp literally smothered the electric lights. They looked positively billious alongside of the soft white radiance of Rushin's gift. I soon turned them off and sat down to read by the light of my new lamp. It proved a revelation in eye-comfort. It brought out in per-

fect distinctness the lines on the printed page, and I soon found I could read as well and as long by this artificial light as ever I could by daylight. I soon moved my typewriter from my office to my home, because in the office I could get no gas light by which to work at night. In fact, I worked my gas lamp overtime in the years that followed its installation, and never again did I use electric light in that "den."

Becomes Ardent Advocate.

It is hardly necessary to state that shortly after this incident there appeared in the daily papers of that city some very earnest advertising on the subject of gas lighting. I even went so far with it that the electric department complained that I was showing partiality, although I was endeavoring to maintain the company's policy of neutrality as between electricity and gas for lighting. I became an ardent advocate of gas lighting, nevertheless, and as the years have gone by and new improvements were added to gas light equipment, and I observed the growing popularity of gas units in homes, stores and factories in all parts of the country, my enthusiasm for the commodity has increased. I studied gas as an illuminant then. I have studied it since, and I am still engaged in that interesting occupation, with constantly growing confidence in its superiority over all other forms of artificial light.

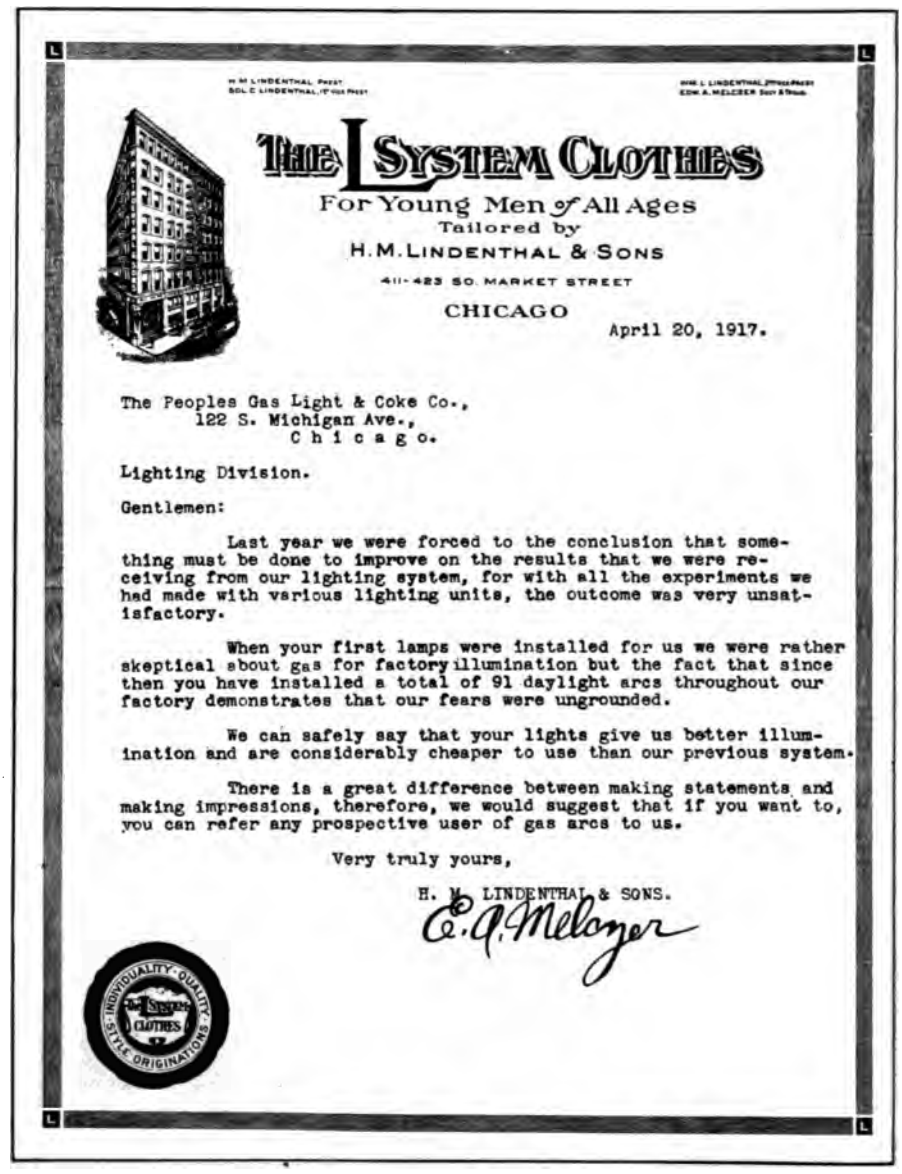
With this rather extended story of my conversion to gas lighting, it can be readily understood that it requires no new evidence of any kind to convince me that gas lighting is superior in every respect to any other form of illumination. I am completely "sold" in that line, lock, stock and barrel. Jim Rushin, with all his very definite work for gas, never did a more finished job than he did when he educated me.

It can also easily be conceived with what interest I read a book the other day compiled by Charley Luther, manager of the illuminating department of the Peoples Gas Light & Coke Co., of Chicago. Now, if there is one gas lighting enthusiast in this country to whom I would yield, in my own and Jim Rushin's claims to the thirty-third degree in that respect, that one is Charley Luther. I must add that before reading his book I wouldn't yield him an inch, either on my own account or Jim's. After reading that document, however, I must in all fairness hand over to Charley any or all tokens, decorations, insignia or emblems denoting advanced rank in the new national army of dyed-in-the-wool, signed-sealed-and-delivered gas lighting scrappers. Not that I acknowledge, even now, a stronger set of convictions on his part; but in this book, brought out for Chicago citizens to read, he has stepped out in front of us who only have convictions, and has gathered in a lot of documentary evidence that no man in his right senses will fail to recognize as the rock-ribbed, indisputable proofs of gas lighting's supremacy.

Big, Overwhelming Proofs.

Frankly, I didn't believe such proofs, and such a big, overwhelming quantity, would ever be gathered together in the interest of gas lighting. I knew that here and there in every community were individuals thoroughly convinced that gas is the logical means for illumination, and who were willing to tell the world what they think about it. But, taking my own case as an illustration, I had an idea that ardent advocacy of this illuminant would be confined to those of us who had been educated on the inside, as it were, with comparatively few exceptions from the outside.

Charley Luther evidently felt otherwise about it. Perhaps he has had the same experience with many, many individuals that Jim Rushin had when he made me see gas light. At any rate, he has here between the covers of one little booklet he calls "Convincing Evidence," a series of signed statements from representative firms and individuals in just about every line of activity in the great city of Chicago.



THE L SYSTEM CLOTHES
For Young Men of All Ages
Tailored by
H. M. LINDENTHAL & SONS
411-423 SO. MARKET STREET
CHICAGO

April 20, 1917.

The Peoples Gas Light & Coke Co.,
122 S. Michigan Ave.,
Chicago.

Lighting Division.

Gentlemen:

Last year we were forced to the conclusion that something must be done to improve on the results that we were receiving from our lighting system, for with all the experiments we had made with various lighting units, the outcome was very unsatisfactory.

When your first lamps were installed for us we were rather skeptical about gas for factory illumination but the fact that since then you have installed a total of 91 daylight arcs throughout our factory demonstrates that our fears were ungrounded.

We can safely say that your lights give us better illumination and are considerably cheaper to use than our previous system.

There is a great difference between making statements and making impressions, therefore, we would suggest that if you want to, you can refer any prospective user of gas arcs to us.

Very truly yours,

H. M. LINDENTHAL & SONS.

C. A. Melczer

INDIVIDUALITY · QUALITY · STYLE ORIGINATORS · L SYSTEM CLOTHES

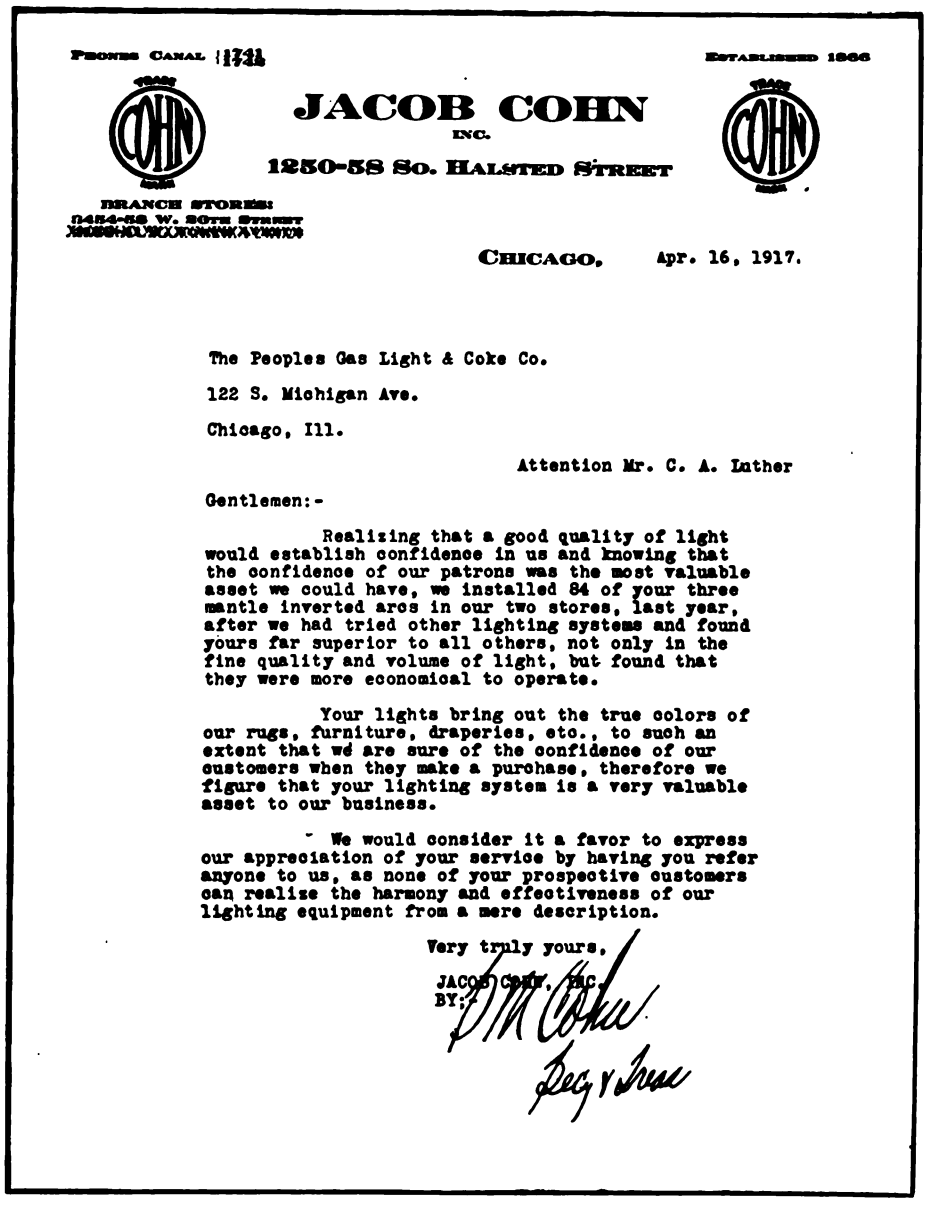
One of Luther's Customers Who Found Gas Lighting Better Than Other Method.

These are not just stock replies to form letters, asking for testimonials. They are red-blooded declarations of praise from red-blooded business men for something they have bought and paid for, and to retain which is still costing them good iron dollars every month. Some of them go into intimate detail to describe the advantages they have derived from gas lights, and expert illuminating engineers could not make a better job of it. For instance, there is a statement from the pastor of St. Ann's Roman Catholic church, who says: "The effect beautifies the ap-

pearance of the church, and the soft mellow light is not trying on the eyes. The light is sufficiently bright to enable everybody in every part of the church to read without any eye strain." With all my years of study in connection with gas lighting, and all my enthusiasm for the industry, I could not say more for it, not even if I were the pastor of a church.

"The colors of the paintings we have on exhibit are reproduced in under these lights the same as if they were in under daylight itself, in fact, our numerous patrons have often remarked about the pictures being shown in their true colors.

"We stand ready to recommend this type of lighting to anyone who desires a light for any kind of color work."



PHONES CANAL 1741 1742 ESTABLISHED 1866

JACOB COHN
INC.
1250-58 So. HALSTED STREET

BRANCH STORES:
3454-58 W. 20TH STREET

CHICAGO, Apr. 16, 1917.

The Peoples Gas Light & Coke Co.

122 S. Michigan Ave.

Chicago, Ill.

Attention Mr. C. A. Luther

Gentlemen:-

Realizing that a good quality of light would establish confidence in us and knowing that the confidence of our patrons was the most valuable asset we could have, we installed 84 of your three mantle inverted arcs in our two stores, last year, after we had tried other lighting systems and found yours far superior to all others, not only in the fine quality and volume of light, but found that they were more economical to operate.

Your lights bring out the true colors of our rugs, furniture, draperies, etc., to such an extent that we are sure of the confidence of our customers when they make a purchase, therefore we figure that your lighting system is a very valuable asset to our business.

We would consider it a favor to express our appreciation of your service by having you refer anyone to us, as none of your prospective customers can realize the harmony and effectiveness of our lighting equipment from a mere description.

Very truly yours,

JACOB COHN, INC.
BY: J M Cohn
Secy & Treas

This Customer Uses Gas Lighting to Build Confidence in His Business.

The president of an art gallery company wrote this burning epistle:

"The ten daylight arcs equipped with your special photo reflectors installed in my art gallery, as well as the two daylight arcs installed in my exhibit window, we can safely say are the best lighting equipment we ever had.

"They not only give us a great amount of light, but also deliver a light that cannot be equaled from a quality standpoint.

From a wholesale millinery concern, one of the best known in the West, came this one:

"Will you kindly issue an order to install eighty (80) of your 'Radio Daylight' gas arcs in our new establishment located at 29 to 35 South Wabash Avenue. We are desirous of having them installed within the next week.

"After studying the lighting question from all angles and after trying different kinds of units other than gas, we came to the conclusion that your system was the only type that we should install in our new place, inasmuch as we have been using 101 of your lamps for nearly three years and have found them superior to other lights we have tried from time to time, both in cost of operation and the daylight qualities which is very essential in our business for color distinction.

"The above added to the exceptional maintenance service you render warrants us in continuing your service."

Convincing Evidence.

But what I was about to say is this: While it needs no new evidence to convince me of the superiority of gas lighting over all other means of illumination, there are hundreds, thousands, millions of others who yet feel as I once did about gas lighting, before Jim Rushin got to me ten years ago down in Georgia. There is literally a whole world of good people willing and anxious to be convinced, because the lighting methods they employ now are not satisfactory. And Charley Luther, in his little book, has supplied us gas men with the "Convincing Evidence." This advocate of gas lighting has multiplied Jim Rushin and me by hundreds, and has gathered together the stories of his converts, any one of them more eloquent and more convincing than mine, into one little volume. It would seem from reading their statements that one and all they came over to gas lighting for no earthly reason except that they tried out every available means for artificial lighting and finally favored gas lighting above all others because it gives better light and does not cost as much as electricity and other methods. You cannot get any

CONVINCING EVIDENCE.

Some of the subjects on which C. A. Luther's new book presents complete evidence from actual experience of gas light customers are as follows:

Eye Strain.
Considered an Asset.
Satisfying Customers.
Steady Light.
Confidence of Customers.
That "Public Be Damned" Spirit.
Assisting Isolated Electric Plants.
Eliminates Glare.
Eliminates Heat.
Eliminates Drop Lights.
Increases Efficiency of Employes.
Working Conditions Improved.
Increases Congregation.
Loss by Breakage and Theft of Electric Lamps.
Skeptical About Gas Lamps; Now a "Booster."
Electric Lamps Burning Out and Blacking Up.
Fake Lamp Company.

other impression on of their declarations. It is there in black and white, and in a majority of cases the writers beg for an opportunity to tell others—to tell the world—how they feel about it.

I certainly mean to keep my copy of this book always close at hand. If I were a gas light salesman, or a commercial manager of a gas company, or a manager, I would be more than happy to bring within my "Governing Events" that I would think of going around like the Lady Godiva without clothes.

Remark of Good Service.

Now there are a great many people who read this story of Charley Lurcher's book who will overlook without thinking that all these remarks and further proofs of gas lighting supremacy were secured by the mere posting of a letter to customers. I asked Charley the other day a question along this line to my whatever interest he had arisen in my own mind about the phase of the subject.

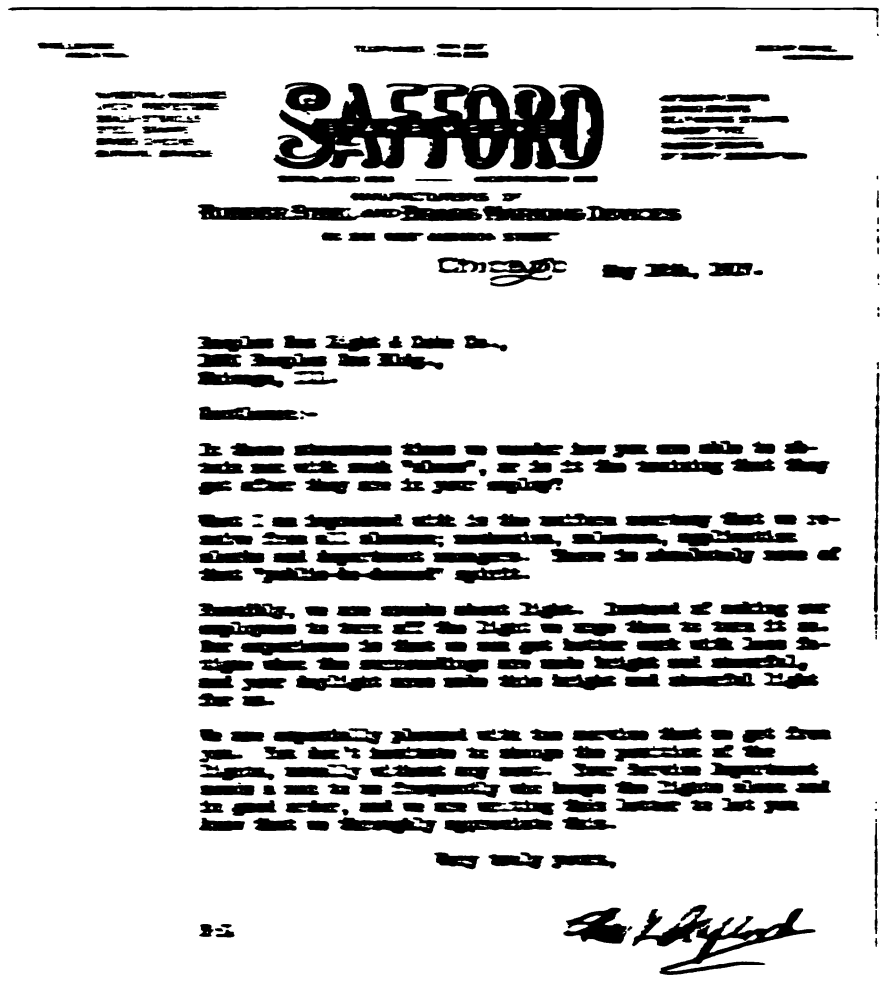
"Why, I'll show you all I did," he promptly replied, and thereupon drew me back to the "There's the correspondence in the case from my side of it. That little book there is the correspondence of the satisfied customers side of it."

The letter he showed me contained no requests for endorsements of gas lighting. As manager of the illuminating division of the Peoples Gas Light & Coke Co., Mr. Lurcher had sent out inquiries to ascertain if the lighting service under his direction was proving satisfactory. This action on his part was a bit of the day's work, nothing more. He wanted to know if the service his customers were receiving and paying for was good service in their estimation. The maintenance work of the Peoples Gas Light & Coke Co. is not free maintenance, but it is bought and paid for and it is one of Mr. Lurcher's regular duties to see that it is "as advertised"—in other words, according to Hoyle—regular maintenance service. In his own mind he knew the gas lamps he had installed were regular lamps. He knew his men were on the job keeping the lamps up. But what did the customers think about it? So he sent out his inquiry.

Charley was intensely pleased with the first answers that came back to him. One ran like this:

About Maintenance Service.

"In these strenuous times we wonder how you are able to obtain men with such class; or is it the training they get after they are in your employ? What I am impressed with is the uniform courtesy that we receive from all classes, mechanics, salesmen, appliance men clerks and department managers. There is absolutely none of that public be damned spirit. Possibly we are cranks about light. Instead of asking our employes to turn off the light we urge them to turn it on. * * * We are especially pleased with the service that we get from you. * * *"



SAFFORD

MANUFACTURERS OF
ROBERTS STREET AND DRIVEWAY WARNING DEVICES
OF ALL KINDS

Chicago May 18th, 1917.

Douglas Gas Light & Coke Co.,
1111 Douglas Gas Bldg.,
Chicago, Ill.

Gentlemen:-

In these strenuous times we wonder how you are able to obtain men with such "class", or is it the training that they get after they are in your employ?

What I am impressed with is the uniform courtesy that we receive from all classes, mechanics, salesmen, appliance clerks and department managers. There is absolutely none of that "public-be-damned" spirit.

Possibly, we are cranks about light. Instead of asking our employes to turn off the light we urge them to turn it on. Our experience is that we get better work with less fatigue when the surroundings are made bright and cheerful, and your daylight gives us this bright and cheerful light for us.

We are especially pleased with the service that we get from you. We don't hesitate to change the position of the lights, usually without any cost. Your service department seems to be frequently who hangs the lights about and in good order, and we are writing this letter to let you know that we thoroughly appreciate this.

Very truly yours,

S-2

Some of "That "Public Be Damned" Spirit. This Customer Says.

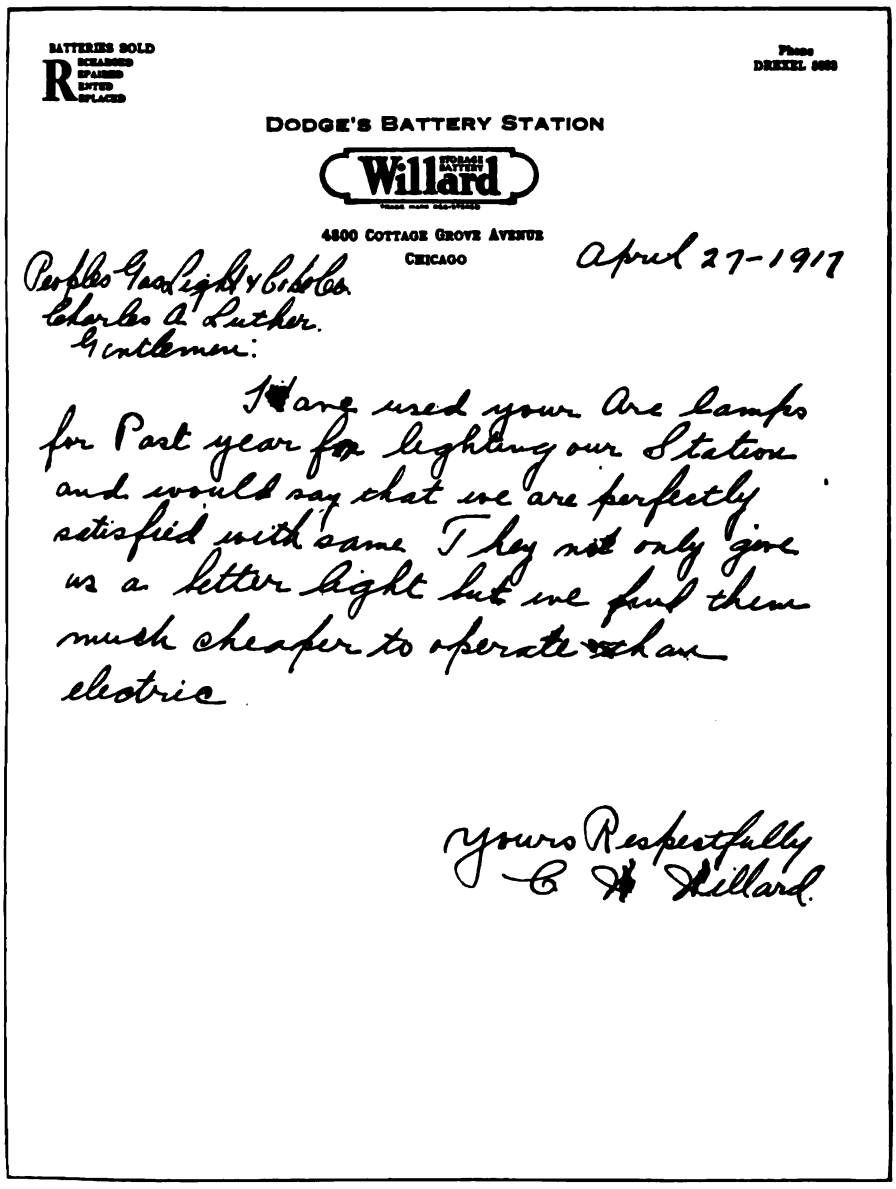
Answers like this nearly knocked Charley Lurcher out of his chair. He really expected satisfied replies to his inquiries, but he didn't expect his customers to toss up their hats and cheer about his service. Yet that is what they did, figuratively. Letter after letter came pouring in. They came from every class of trade and all professions and industries. Some stated that the lighting system was highly satisfactory, and let it go at that. Others declared they had tried all other methods of lighting and found gas lighting the only satisfactory method. Many, many of them openly assailed electric lighting as more expensive and less efficient than gas lighting, and this after they had tried both systems out to a golden brown finish. As a matter of cold hard fact there never has been such a complete knock-out handed electric lighting as this collection of letters slips over. There simply isn't any comeback to it. Over two hundred of the leading commercial and professional interests in the largest industrial city in this country stand right up in meeting and shout their preference for gas lighting, and this after long, personal experience with both gas and electric lighting. The evidence is more than convincing. It is just fairly annihilating. The case is perfect in favor of gas light.

Decides To Publish It.

It was only after great numbers of these red-hot replies had been received that Charley Lurcher decided to publish them in book form and put them in the hands of his salesmen as handbooks on gas lighting. Of course, the gas equipment manufacturers heard about them and one, at least, has

asked Mr. Luther for permission to duplicate the publication and present a copy to every gas lighting salesman in the country so that the whole industry might reap the benefit to be derived from such a stunning proof of gas lighting supremacy. It is therefore likely that very soon these books will be in general circulation throughout the industry, and it is a big, constructive thing for a manufacturer to do. It will cost a pretty penny to give all the lighting salesmen in this country a book like this. It is a handsome affair, in purple and gold, with every letter of the Chicago enthusiasts reproduced in halftone on fine stock. But what is cost in comparison with the tremendous wave of new confidence and active, ardent advocacy of gas lighting that will follow in the wake of Charley Luther's book, wherever it is circulated?

With characteristic thoroughness, Mr. Luther has cross indexed his volume so that the letters can be readily referred to under their proper classification, in groups representing all the lines of metropolitan activity, and again classified according to the particular character of lighting they deal with. In this respect they completely cover every possible field the gas man may encounter in his endeavor to promote human health, happiness and prosperity by means of the Supreme Illuminant, the blessed modern gas light.



BATTERIES SOLD
REGARDED
REPAIRED
RENTED
REPLACED

Phone
DREXEL 8000

DODGE'S BATTERY STATION

Willard

4800 COTTAGE GROVE AVENUE
CHICAGO

April 27-1917

Peoples Gas Light & Coke Co.
Charles A. Luther.
Gentlemen:

I have used your Arc lamps for Past year for lighting our Station and would say that we are perfectly satisfied with same They not only give us a better light but we find them much cheaper to operate than an electric

Yours Respectfully
C H Willard.

And Here's the Electrical Folks Who Prefer Gas Lighting!

A LAUNDRY DEPARTMENT.

Chicago Company Institutes New Feature in Commercial Section.

With the acute servant problem, the necessity of making clothes last longer, and one thing and another, the home gas laundry is coming into its own. The Peoples Gas Light & Coke Co. now has a domestic laundry department that is doing a raft of business under the management of a capable and enthusiastic new business man, W. D. Roberts.

Starting with the gas irons and the popular priced Almetal washing machine, the department expanded until now it sells higher priced washing machines such as the Thor and the Easy, Thor and Simplex ironing machines and clothes dryers. Of course, laundry stoves and gas irons always had been sold. The annual Iwantu campaign, however, was as near as the company got to a laundry campaign until this year.

The gas company sends out a woman demonstrator to teach the householders the correct operation of each machine that is purchased and as a result the complaints have been remarkably few. The ability of the gas company to make easy terms is helping the gas company to cash in on the extensive advertising of washing machine makers, as there is a very large class that has been "sold" by the advertising but refrains from ordering on account of the price.

On account of the interest that has been stirred up by the gas operated washing machines, many makers are planning gas burners for their appliances. This improvement provides hot water all of the time and consequently rapid results. The ordinary washing machine allows the water to cool and the stubborn part of the washing is done in the cold water.

Many of the machines in the Peoples' home laundry department are electrically operated with gas burners.

The success of this department has justified the careful planning of New Business Manager Knight and his associates, and it is expected that many other gas companies in the near future will take a tip from Chicago and get busy.

In the larger territories the gas companies already are drumming up the domestic laundry business. St. Louis has done some strong advertising on the proposition and the Public Service Gas Co. of New Jersey, has given it several pages in its catalog.

More Benzol Production Being Arranged for.

The by-product coke and benzol plants of the Youngstown (O.) Sheet & Tube Co. are to be enlarged 50 per cent. The improvements, costing $3,000,000, to be completed in one year.

The Atlas Chemical Co., recently incorporated at Toledo, with a capital of $1,000,000, also is to distill toluol and benzol on a large scale.

718691

1917 Illumination Report

N. C. G. A. Committee Makes Exhaustive Analysis of Gas Lighting Field and Presents Plans for Developing This Important Business

By Thos. Scofield, Chairman

The intention of this report is to show concisely the present position of gas lighting, its great importance and immense value to the gas company. Furthermore, it is intended to analyze a few of the causes which seem to deter some companies from entering or extending the gas lighting field and to refute a few arguments which are advanced against such action. It is also the purpose of this report to emphasize the great possibilities opened up for every gas company that makes a determined and aggressive effort to secure and retain gas lighting, and what it means should these possibilities be disregarded. Lastly, it will endeavor to point out a few essential points which must be considered in order to successfully engage in and to enlarge the gas lighting business and to give a few general recommendations thereon. In doing this, only experience and established facts will be advanced as arguments. It is felt that a careful consideration of these facts will accomplish more than the consideration of many arguments based on conjecture and supposition. As a part of or as a supplement to this report there will be papers covering the essential points pertaining to gas lighting. These papers will tell how gas lighting can be done by men who have actually done it.

Recent Great Changes.

Recent years have seen great changes in gas lighting equipment. Remarkable improvements have been made in the units in available sizes and types, and in burner efficiencies. Great strides have been made in fixture design and construction. Likewise, the enclosing media for all varieties of units have been greatly increased in variety, utility and beauty.

Gas lighting is one of the most reliable sources of illumination. The supply of energy is easily stored and this, with modern methods of manufacture and distribution insures gas lighting against the recurring and irritating interruptions so common to other sources.

The fire records of cities in every section of the United States and abroad, show that in proportion to the number of consumers, the number of fires due to gas is less than the number arising from any other source of energy. The records also show that the total financial loss from gas fires is very much smaller than the total from fires caused by other sources. The *safety* of gas lighting, then, stands out prominently as one of its great recommendations.

The adaptability of modern units and fixtures has been mentioned. The great variety of glassware, the artistic shades of silk or other fabrics, the carefully and correctly designed reflectors, and artistically designed and beautifully finished fixtures and the adaptation of our commodity to the semi-indirect lighting system, make gas most suitable for every class of interior and for every variety of lighting work.

Hygienic Advantages.

The *hygienic advantages* of gas lighting have been pointed out and proved by the most competent authorities. Increased *ventilation*, the sterilizing effect, the addition of necessary moisture and the negligible effect on temperature, are advantages of the first magnitude in favor of gas lighting.

The soft, *restful light* from gas is especially beneficial for the eyes as exhaustive tests have conclusively shown. The very close approach to *daylight color value*, a most important feature of the gas unit, is a decided advantage. No considerable losses are necessary for correction for daylight as in some other commercial units. If color effects are desired they are easily and economically obtained from this white light source.

In point of *convenience* the modern units, with their single or double chain pull or key by-passes and pilots, make the ease of operation all that could be desired. Successful and satisfactory methods of distance control are also available, such as the mercury and magnet valves and wall push buttons, which place the gas unit, in the matter of convenience of operation, in successful competition with any of its rivals.

Recent developments have given us a very wide range in sizes of units. At the present time, we find units of suitable dimensions and power for the illumination either of the smallest area by local lighting or for the illumination of the largest area by general lighting. Therefore, in this essential point of *flexibility* gas is the front rank of lighting agents.

Its unquestionable *economy* needs only the merest mention. These developments and progressive methods have not been excelled by any competitive lighting units or systems, and gas lighting is still far in the lead in the question of cost of operation.

Let us now consider some of the arguments that are advanced against gas lighting and see what merit they have, if indeed they have any at all.

Arguments Against Gas.

"Gas lighting is unable to compete with modern illumination from other sources." It cannot be possible that any gas company, conversant with the present status of modern gas lighting can entertain such an argument. A careful study of the salient merits mentioned above, which are conservatively rather than radically phrased, will at once convince anyone of the fallacy of this argument. Furthermore, the success which has been met with where energetic effort has been made, irrevocably contradicts and falsifies such a conclusion. As examples we may cite Wilmington, Del.; Toronto, Canada; Newark, N. J.; Jersey City, N. J.; Haverhill, Mass.; Detroit, Mich.; New Haven, Conn.; and many others.

If a further proof that gas can compete with other modern illuminants were needed, the statements from a publication of the Bureau of Standards can be cited. The pamphlet referred to is Bulletin No. 55, "Measurements for the Household." On page 70 of this Bulletin the Bureau shows the relative costs of producing 1,000 candle-hours of light using various commercial sources. Included in this data is energy cost and cost of replacement of mantles or electric bulbs. The illuminants considered and their costs are as follows:

Candles	$2.00
Kerosene flame	.19
Kerosene mantle	.06
Gas open flame	.24
Gas mantle	.06
Carbon electric	.35½
Gem electric	.26
Tungsten electric	.13

This clearly shows the economy of modern gas lighting—which costs less than all the other illuminants with the exception of the kerosene mantle, a source infrequently found in use.

On page 69 is found the following, referring to both gas and electric units:

For the production of light a great variety of lamps are available, and in some kinds remarkable improvements have been made in the last few years. These improvements have made it possible in many cases either to improve the lighting of the home without increasing the cost or to reduce the cost.

The Bulletin with the standing given it by this government Bureau clearly shows that modern gas lighting can compete with any other illuminant.

Profits in the Business.

"There is not sufficient profit in the lighting business." Our present "send out" for lighting can be conservatively stated to be 40 per cent., if not 50 per cent. of the total send out. Now, the same relative charges for promotive effort should be made against gas lighting as are made at present against fuel and power business. This is most conervative. In other words, no unfair discrimination should be made against such a large percentage of our total send out. If this fair policy is followed there will be an equal return per cubic foot from gas lighting as from other gas business. This is bound to be true since no different manufacturing or distribution costs are encountered, and is further borne out by the experience of companies that actively push gas lighting and make this fair apportionment of charges against it.

Furthermore, examples right before us prove this point beyond doubt. There are many combination gas and electric companies who are at the present time carrying on continuous and strenuous efforts to secure and advance gas lighting. If there were no profit from this lighting business would they continue to do this? They are not doing it for philanthropic

reasons, but because they are making money thereby. This can easily be understood. Since gas can be stored and since the gas lighting demand in factories and other installations comes at the time of the peak of the electric load, it becomes profitable for these combination companies to seek this gas lighting business. If this were not true, these companies would only too quickly discourage all gas lighting and so relieve themselves of such a large and unprofitable portion of the business. That gas lighting is profitable business when fairly and energetically treated is beyond dispute.

The Field for Gas Lights.

"There is no field for gas lighting." The gas lighting field naturally divides itself into two main divisions—prospective lighting business and actual or present lighting business. It will only be necessary to consider the field at the present time to prove the absolute absurdity of this statement. A consideration of the size and magnitude of the field now open to us, and being operated, will be sufficient encouragement and argument without taking into account the vast field of new and prospective business. For this purpose let us consider the following figures of gas and electric meters installed at the present time in 40 cities throughout the United States.

In these 40 cities, having a total population of about 16,000,000 and representing East, West, North and South, there are 4,380,522 gas meters in use and a total of only 1,691,130 electric meters in use. Taking the most conservative assumption that there is a gas meter in every location where an electric meter is installed let us see what we get. This means that there are 2,689,392 locations where gas only is supplied—there are 2,689,392 lighting installations to modernize and bring up to date and to hold—there are 2,689,392 intallations where electricity cannot possibly be used at the present time—there is a field of 2,689,392 locations for gas lighting work. Thus, in a consideration of the grand total of 6,071,652 gas and electric consumers, a per cent. of 44.29 of this grand total forms a productive field for energetic gas lighting effort, and this without any consideration of future business in new buildings, or business secured in preference to some other illuminant now used.

In considering these figures the following assumption has been made, which we believe is an entirely fair one. Assume the same percentage of the total electric meters used for purposes other than lighting, as the percentage of total gas meters used for fuel and power. Can there be any doubt that modern gas lighting has a field in which to work?

What If It Is Lost?

Let us now consider briefly what may happen if no effort be made to properly take care of this lighting business. There is but one general answer. Most of it will eventually be lost, perhaps all of it. It is not reasonable to suppose that the gas industry wishes to stand inactive while this business, already connected, slowly slips away. With the loss of the lighting business will come the loss, in many cases, of other business in the same location. This will naturally follow. It certainly would be poor policy to allow this to occur, and it can only be effectually prevented in one way—energetic and intelligent effort to hold the present gas lighting business.

What advantages can accrue from holding this present connected lighting load? If this business is held it means that these installations will be up-to-date and modern. Now, the use of gas for lighting is more in evidence, is more apparent and more continuously before the consumer than any other application of our product. Modern lighting, with all its attractiveness, will become a widespread and far reaching advertisement for the commodity gas and for the gas company. It will be the right kind of advertising, for the holding of its lighting business necessarily means satisfactory *service*. There is no business which cannot profit by good, clean and attractive publicity. The gas industry surely can use it to great advantage. This publicity will benefit not merely the gas lighting, but unconsciously the public will associate the modern ideas and satisfactory service of this lighting, with all the other uses of gas. This one consideration alone makes the effort to hold this business decidedly worth while.

Modern satisfactory lighting service will not only advertise, but it will directly influence the actual *use* or adoption of gas for other purposes. A satisfied consumer using gas lighting will prove to be an easier prospect for fuel or power than one who has given up the use of gas for lighting. The experience of those companies which have gone after the lighting business proves this.

Committee Recommendations.

That each and every gas company inaugurate a systematic movement for the equipping of old fixtures now in place, with the most modern and efficient lighting units and accessories, and for the refixturing of present installations with the most modern fixtures and up-to-date equipment.

There are two points of vital importance to the acquisition of new lighting business. These are the installation of complete and adequate gas piping in new structures and the equipping of these new buildings with modern gas lighting fixtures.

The securing of adequate and complete gas piping is of course fundamental in any movement connected with the gas lighting of new edifices. This should be made the starting point for such work. By complete and adequate piping is meant the installation of ceiling, side-bracket and floor or baseboard outlets with running lines, feeders and risers of capacity large enough to meet any demand which may be made in the future. Without this piping there can be no hope that gas would be used for lighting, unless the expense and inconvenience of installing the piping system after erection is forced upon the owner, as it frequently is. Even if another form of illumination should be intended, piping for gas fixtures should be installed in all new buildings, public or private, if only for the reason that a competing method of lighting is provided for, and always available as a guarantee that lowest lighting rates will be commanded both now and as long as the building lasts. The importance of this work cannot be overestimated. While we are dealing only with the lighting problem and the piping necessary for this work, any effort along these lines should strongly emphasize the inclusion of baseboard or floor outlets at the time the piping is installed. The additional expense is trifling, and these outlets are often the means of securing the utilization of gas in portable lamps and in many small fuel appliances, for heating, minor cooking operations, water heating, laboratory work, etc.

Fundamental Work.

That this extremely fundamental work is important is best illustrated by the many localities now aggressively attacking this phase of the problem. Such cities as New Haven, Newark, New York, Wilmington, Chicago, Philadelphia, and many others have actively taken up this profitable work, and not only have they taken it up but they have met with marked success. No more tangible proof is needed of the importance of this aggressive effort than the fact that these companies have deemed it advisable to maintain special branches of the service devoted solely to the piping of new buildings. No further argument as to its feasibility and advisability is needed than the success attained in this hitherto almost uncultivated field.

Your Committee wishes to recommend that gas companies make a decided and, if necessary, a co-operative and concerted start to secure the fixturing as well as the piping of new structures with well designed, modern and appropriate gas fixtures.

In this great lighting field, there are two classes of service which are worthy of special mention. One is factory or industrial lighting and the other is store lighting. A few comments may be made on each.

Factory Lighting.

Factory or industrial lighting is an excellent field for profitable work. Correct lighting of industrial establishments has been proved to increase their efficiency and profits. Modern gas lighting is the most economical means of bringing about this desired increase, and is especially to be recommended and strenuously advocated, since modern gas lighting possesses the advantages of color of light, quality of light and hygienic attributes not found in other illuminants. Industrial lighting is also long hour lighting and practically a constant lighting demand. With these advantages to both the consumer and the company, this lighting business becomes comparatively easy to obtain and results in a most profitable source of revenue. Furthermore, the advertising value of industrial lighting among the employes is incalculable.

That it is easy to secure is shown by the many installations obtained in those localities where a well sustained effort has been made. Almost every city has, moreover, many manufacturing or industrial establishments that should and could be gas lighted if the effort were made. Furthermore, experience has shown that very often the installation of gas lighting has been the means of securing the entry of gas for industrial purposes. Your Committee feels that, with gas lighting so thoroughly qualified for this work, and with so many advantages accruing from it, it should lay special emphasis on this class of lighting installation.

Store Lighting.

Store lighting is another special subdivision which is believed to be worthy of separate mention. Not only is it worthy of treatment in this way, but it is felt to be necessary to take it up thus specifically. This is due to the seeming neglect of the gas companies to make any attempt to secure this type of business.

Gas, used in the modern units and fixtures, has distinct features which make it peculiarly adapted for store lighting. The resultant color of gas light insures the display of goods as in daylight, an ad-

vantage of inestimable value to the merchant. The economy of this advantageous light makes possible the most brilliant lighting for advertising purposes, without great operating cost. Store lighting presents many advantages to the gas company. The constant demand makes it desirable. The long hours of use stamp it as good business, and its great advertising value places it in the foremost rank, in the classes or divisions of gas lighting business. The value of the advertising secured from many modern, well designed and satisfactory store lighting installations cannot be overestimated. It not only advertises gas for lighting, but the entire service furnished by the company.

In the localities where store lighting has been persistently sought many installations have been secured and many satisfied owners have been won over to gas lighting and gas service. So much benefit is derived directly and indirectly from this class of service, that your Committee has given it this separate special mention.

Maintenance Imperative.

Probably the most important question of all remains for attention in this report. It is one which applies to all classes of lighting, residence, factory, office, and store.—in fact to every installation, no matter what its character, if it uses modern mantle lights. This Committee feels that on this one paramount feature depends the success or failure of all gas lighting. This is the question of *maintenance.*

No matter how successful we are in securing the piping and fixturing of new buildings, the re-equipping and modernizing of old installations in domestic, commercial and industrial lighting business, we can never hope to give the fullest and most satisfactory lighting service to the consumer without a satisfactory and adequate system of maintenance. It is granted by everyone that unless the best lighting service possible be given, our lighting business will suffer. It is, therefore, easily seen how fundamentally important this question becomes.

Your Committee cannot make this too emphatic. It believes that a comprehensive maintenance system should be provided in all localities. By comprehensive system is meant one that covers the following requirements—

1. Maintenance throughout the entire district supplied.
2. Maintenance of all classes of lighting.
3. Attractive maintenance insuring the co-operation of the consumer.
4. Maintenance of the maximum efficiency of burners and equipments.
5. Maintenance that is as near self-supporting and practicable as possible.

Your Committee wishes to recommend most strongly, therefore:

That every gas company institute some systematic, comprehensive system of maintenance which will provide for the thorough cleaning, adjusting and repairing of all mantle units in the district supplied, so designed as to be as small a burden and inconvenience to the consumer as is consistent with efficient and careful work.

Importance of Publicity.

Your Committee wishes to take up one more general point which, while referring to gas lighting principally, may be advantageously applied to the entire field of utilization of gas. While it is not within the scope of this Committee's work to treat any subject other than lighting, this last consideration is so closely linked with all other uses that the Committee feels justified in broadening these recommendations. We refer now to *publicity.*

Gas lighting of all the uses to which gas is put is so constantly apparent, and is so consistently used in season and out of season that it is better adapted to favorably influence the consumer than any other service for which gas is available, except perhaps cooking. Furthermore, it is the one use of gas which has received perhaps the smallest amount of advertising and about which the public knows the least. This, then, should be the one service which should receive the greatest share of publicity.

GETTING AN EYEFUL.

Prominent Gas Managers Visit Welsbach Plant at Gloucester.

Gas managers throughout the country are daily availing themselves of the opportunity of visiting the largest gas mantle factory in the world. To look for two hours at the twenty-five hundred employees busily engaged making one hundred and seventy-five thousand mantles per day cannot but impress upon the mind of the gas manager the thought as expressed by a recent visitor:

"Evidently there is a greater future for gas lighting than I have permitted myself to believe. The Welsbach Co. seemingly looks with great confidence to the future so I guess it's up to us gas men to get busy and do our part."

Visitors are always cordially welcome at this new million dollar plant and every effort is made to make their visit entertaining. Located on the Delaware river below Camden, it is easily and quickly reached from Philadelphia.

A group of live wires from the New England section, on their visit to the Welsbach plant, July 12th, is shown in the picture. They are, reading from left to right, top row: A. R. Burr, New Haven Gas Light Co., New Haven, Conn.; J. P. Osterhoudt, Welsbach Gas Lamp Company, Schenectady, N. Y.; W. C. Riverburgh, Kingston Gas & Electric Co., Kingston, N. Y. Bottom row: R. F. Whitney, Peoples Gas & Electric Co., Oswego, N. Y.; W. G. Furlong, Municipal Gas Co., Albany, N. Y.; E. S. Chapin, Welsbach Gas Lamp Co., New York City; H. L. Barnes, Hartford City Gas Light Co., Hartford, Conn.

Group of New England Managers at Welsbach Plant.

School for Food Economy

Consolidated Gas Co., Co-operating With Department of Agriculture, Operates School and Instructs Thousands in Conservation and Preserving

By Robert Livingston

American women are responding nobly to the President's call to conserve the country's food supply. Everywhere there is keen interest in canning, preserving and dehydrating but the need has never been so great before this war year and instruction in the best methods is very essential. To meet the need for instruction so that housewives may do their part in the most intelligent way the United States Department of Agriculture in co-operation with the Consolidated Gas Co. of New York, is holding an exhibition and a system of demonstrations which are as unique as they are timely.

The Consolidated Gas Co. which suggested this enterprise, thus making New York an educational center for the instruction of the surrounding communities in the arts of food conservation and preservation, has donated for the central exposition the second floor of its recently completed building, Nos. 212-218 West 57th street. A carload of exhibits from the Department of Agriculture including dehydrating apparatus as well as many of the instructive food cabinets displayed in the San Francisco Exposition was sent from Washington and they are now affording much interest and entertainment to the thousands of visitors at the 57th street exhibit. It is Uncle Sam's idea that with more knowledge of foods and food conditions there will be more intelligent buying and this, of course, is the first step toward getting the best results in individual homes. In the cabinets are samples of perfect fruits, grains, meats, etc., ranged along by samples of blighted or imperfect varieties. From the attention given the samples by groups of women before and after the lectures it is evident that Manhattan marketers will be keener judges of what they buy in the near future.

Officials in Charge.

Prof. F. Lamson Scribner, chief of the Agriculture Department's bureau of exhibits is in general charge of the display. Other experts from Washington who have been in attendance at the exhibition are Mr. Ormsby, Prof. Scribner's chief assistant and O. H. Benson, chief departmental expert on food dehydrating, canning and preserving. Mr. Benson, prior to the opening of the exhibition gave a series of lectures and demonstrations to the women demonstrators of the Consolidated Gas Co. Fully qualified in the governmental methods of canning and dehydrating, these women are now giving free demonstrations daily, except Sunday, in the various gas offices tributary to the Consolidated in Manhattan, the Bronx, Westchester county and Brooklyn. To all of these the public is invited.

Demonstrations and lectures on canning, dehydrating and preserving are given daily, except Sundays, in the West Fifty-seventh street building by Miss Mabel Crosswell from eleven o'clock in the morning to one o'clock in the afternoon and from two o'clock in the afternoon to four. Among those who have taken an active part in the preliminary training of the large number of prospective demonstrators for the various gas offices are Miss Hooker, who is the leading woman demonstrator of the Department of Agriculture and Miss Van Rensselaer and Miss Lucille Brewer, both of the New York State Agriculture College at Ithaca, who have been closely identified with the educational movement now in progress throughout this state with the aid of a demonstration car operated over the lines of the New York Central Railroad.

Department's Biggest Exhibit.

Professor Scribner has said that he regarded this as the biggest thing the department had yet undertaken in the way of educational propaganda on the conservation of food products, as it has established for a period of four or five weeks at the time when it is most vitally needed, a metropolitan headquarters from which is radiated practical information and instruction to the rest of the country. The exhibition opened on August 6th and will continue for a fortnight longer.

Acknowledging the Consolidated Gas Co.'s offer of the use of its new building, Secretary Houston, of the Department of Agriculture, wrote to the officers of that corporation: "In response to the President's appeal large quantities of fruits and vegetables have

Class in New York Food Economy School Watching Dehydrating Process.

been produced in many areas and it is highly important that every effort be made to provide for their effective utilization and conservation. The department, therefore, is very glad to have an opportunity to demonstrate to the people of New York, methods of utilizing and conserving such products by canning, preserving, drying and the like. I am sure that the demonstrations will prove of great interest and I hope it will be understood that everybody interested is personally invited to visit the exhibition."

To insure the inauguration of the educational campaign at the moment when it was most needed and to evade delays incidental to departmental red tape in the obtaining of appropriations, the Consolidated Gas Co. bore the expense incident to the transportation of the carload of exhibits from the capital and agreed to defray the expenses of the government experts engaged in the work while in New York. Apart from the demonstrations of dehydrating and like processes the broad and interesting scope of the government exhibits to be shown in the West Fifty-seventh street building is indicated by this synopsis prepared by Professor Scribner:

Articles on Exhibition.

Exhibits from Bureau of Animal Industry: Meat inspection, model milk house, the story of clean milk, model poultry house and selected eggs for the market.

Bureau of Plant Industry: Cereal investigations, plant diseases, and results of spraying, rice display, selected samples; corn display, selected samples.

Bureau of Chemistry: Egg testing and incubator, charts and samples of baby foods, insecticides and fungicides, charts of patent medicines, etc.; dried fruits and vegetables.

Bureau of Entomology: Specimens of insects of garden and orchard, spraying and other devices for destroying insects—insects that affect the health and comfort of man, insects injurious to wheat and corn.

States Relations Service: Canned fruit and vegetables, prepared corn foods, variety and quantity of food for a family of children, luncheons for laborers; care of foods; saving, that there shall be no waste; maps, charts, photographs, etc.

Bureau of Markets: Model of ship with hold filled with corn, illustrating approved method of stowing cargoes of cereals for shipment abroad; photographs showing methods of handling grain in bulk.

On the ground floor of the West Fifty-seventh street building the Consolidated Gas Co. has arranged a window display showing canned goods, including fruits, vegetables and meats; dried foods, including fruits and vegetables; Indian corn foods in variety; enlarged photographs showing canning operations, home vegetable gardens and the like; illustrated posters applied to the conservation of foods; increase of food production, etc.; bulletins of the department on practical methods of canning and drying foods, suggestions for saving in the kitchen, and economical ways of supplying the table and feeding the family.

"Such a generous response from the gas companies of the country which are so loyally co-operating with the federal authorities to conserve the food products of the nation has already been highly commended by many prominent government officials. The association feels justly proud in having done its share and provided the gas companies with literature which has received such general recognition," says the "Bulletin."

"The news which continues to roll in makes it more and more evident that the ingenuity and patriotism of the subscribing companies have made the national canning and preserving campaign one of the most pronounced successes ever initiated by the association. Two things have been noticeable—the variety of striking ideas by which campaign publicity has been developed in the desire to push the campaign as hard as possible, and the fine spirit of patriotism which has appeared in the attitude of many of the companies."

Consolidated Co.'s Orchestra of Meter Repairers and Class Ordering Pamphlets On Food Preserving.

Who Wants To Sell Gas Heating Apparatus in Italy?

Interested manufacturers are invited to write the Bureau of Foreign and Domestic Commerce, at Washington, for the address of Foreign Trade Opportunity, No. 24882—a man in Italy, who wants prices on gas heating apparatus.

A HUGE SUCCESS.

N. C. G. A. Will Send Out 2,500,000 Pieces of Canning Literature by November.

When our nation-wide home canning and preserving campaign is concluded in November, the association will have provided nearly 300 gas companies with 2,500,000 pieces of specially prepared literature, says the N. C. G. A. "Bulletin" for Sept. To date the association headquarters has received orders aggregating 2,200,000 monthly preserving folders, 37,000 display posters and 100,000 preserving label booklets.

Missouri Utilities Ask Commission for Blanket Raise

The Missouri Association of Public Utilities has asked the state commission for a blanket order authorizing increased rates for the association's 303 corporations and firms supplying water, gas, electric light and other public utilities outside of Kansas City, St. Louis and St. Joseph. The increase in the price of coal in a few months is quoted at 47 per cent. while the cost of labor, appliances and material in the same time has increased 136 per cent.

British Gas Men's War Work

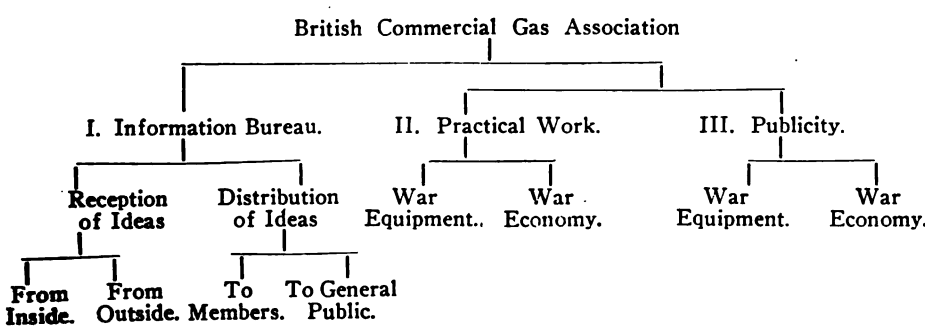
What the Industry, Through Its Representative Organization and Its Other Component Bodies Has Done to Assist the Government in War Time

By the British Gas Association

This article is the first installment of the memorandum prepared by the British Commercial Gas Association on the relation of the gas industry to the war activities of Great Britain, in response to a request made by THE GAS RECORD for this valuable information. This article deals with the mobilization of the British gas industry for co-operation in the various activities of the nation during war emergencies, and is a highly illuminating work for the entire American industry to study as a guide. The British association promises to present, in subsequent articles, the work of each department in detail. The series promises to be one of the most informing and interesting ever presented to the American industry and particularly so to the officers and members of the various committees of our two national gas associations. Other American gas journals please copy.—Ed. Note.

A short preliminary explanation is necessary. The British Commercial Gas Association was already established and had been in working order for some two and one-half years before the war. Composed of representatives of gas manufacturing and supply undertakings, both company and corporation—that is to say, of directors of companies, committee chairmen, engineers, and administrators—and of representatives of gas appliance manufacturing firms, it was uniquely fitted to act as an emergency organization for war service, and to correlate individual energy and initiative with the needs of the time with a success that could hardly have been attained had there been no such representative body in the gas industry.

The accompanying table gives a general idea of the functions and work of the Association, which will be subsequently set out in more detail under their various headings.



I.—INFORMATION BUREAU.

From the outbreak of war the Association declared itself to be as it were a clearing-house for ideas coming both from within and from without the industry, and also ready to furnish information on all points connected with problems of war conditions to—

1. Members of the Association.
2. Non-members of the Association, but members of the gas industry.
3. Manufacturers of munitions, army clothing, etc.
4. Other members of the general public—municipal authorities, public bodies, doctors, architects, teachers, housewives, etc. For instance, between 13,000 and 14,000 copies of "A Thousand and One Uses for Gas" have been distributed per month in suitable quarters.
5. Government departments.

Under this last heading (5) very valuable work was done in co-operation with governmental departments in regard to

a. The enlistment of non-essential men (who were, it may be remarked, in the majority of cases allowed financial support by their employers according to circumstances);

b. Securing for the industry the reservation of essential men; and

c. The substitution of female and other labor.

Another example of similar co-operation is to be found in the negotations carried out through the representative deputations or by the chief officers of the various organizations with the "Priority Branch of the Ministry of Munitions" with a view to securing materials and labor for the manufacture of essential gas plant and apparatus in such a manner as best to fit in with the demands of the services, fluctuating supplies, etc.

II.—THE ASSOCIATION'S ORGANIZATION FOR PRACTICAL WORK

by various branches of the industry resulted in the following measures designed to aid in

A. The Production of War Equipment.

B. The Furtherance of War Economy.

A. War Equipment.

a. The conversion of old factories by the adaptation of plant—
1. From peace to war conditions.
2. From solid to gaseous fuel.

b. The equipment of new factories on modern lines designed to speed up output.

c. The arrangement of exhibitions and demonstrations of gas furnaces and other appliances, and of experimental stations in works, show-rooms, etc., to which any manufacturer of war equipment (whether previously using gas or not) could freely bring any kind of raw material for experimental treatment in existing gas furnaces, etc., with a view to the evolution of new varieties of such apparatus specially suited to his particular industry.

d. The equipment (in many cases free of, or at a reduced rate of, charge and at the very shortest notice) of—
Field camps and kitchens,
Billets,
Y. M. C. A. huts, etc.,
Hospitals (permanent and temporary),
Refugee homes,
Factory canteens, etc., etc.

e. The organization, in co-operation with leading scientific bodies, of illustrated lantern

lectures on the various branches of possible gas service in war time to be delivered before those learned societies by leading men in the gas industry.

B. War Economy.

This section can be further sub-divided under the following heads—

1. Fuel.
2. Food.
3. Life.

1. *Fuel.*

a. The arrangement and free equipment in gas showrooms or other suitable places of demonstrations on—

i. Schemes of economizing fuel.

ii. How to make the best use of the gas cooker.

b. The arrangement of showroom window exhibits—as, for example, of

i. The valuable by-products obtained from the destructive distillation of coal.

ii. Specimen cooked meals with minimum cost of gas in each case set out on cards, together with a comparison of the merits of coal and gas cooking respectively as regards economy both national and domestic.

c. Research into the possibilities of using town's gas in place of petrol as motor fuel.

d. Research (with the assistance of the London Coke Committee) into the possibilities of using coke for commercial motors, in order to cope with the shortage of petrol and coal, and establishment of coke depots on main routes for picking up supplies.

(In addition to the foregoing, the Institution of Gas Engineers and the National Gas Council have been active in promoting the erection of benzol and toluol recovery plant and in applying to the government for the right to submit the gas manufactured to test according to calorific and not illuminating power.)

2. *Food.*

a. The equipment of demonstration rooms and arrangement of demonstrations on economical cookery (often given by members of the Women's Advisory Staffs of the respective undertakings).

b. The arrangement of showroom window displays of war dishes, uncommon foods, diluted foods, etc.

c. Various kinds of work (*e. g.*, exhibitions, special local advertising, competitions for housewives and cooks) in connection with special campaigns, such as the homemade bread campaign.

d. The assistance by gas managers, either through direct representation on them or through indirect influence, of local War Savings and Food Control Committees.

e. The institution of economical cookery competitions, with prizes, in the schools.

3. *Life.*

The continuation of the peace-time policy of studying public health questions, but now with specific reference to war-time conditions, such as

a. The equipment of small dwellings for munition and other workers with

i. Penny-in-the-slot gas cookers.

ii. Penny-in-the-slot gas coppers for water heating.

iii. Penny-in-the-slot gas fires.

b. The equipment of canteens, baths, huts, etc., in munition and other factories.

c. The refuse-destruction and anti-fly campaign.

d. The smoke abatement campaign.

e. The "Baby Week" campaign.

III. THE PUBLICITY undertaken by the Association was (alike as to its advertisement "copy" and illustrations, and as to its editorial articles supplied by invitation to various journals) systematically co-ordinated with the practical work done, as will be shown by the following items under the two heads of—

A. War Equipment.

B. War Economy.

A. War Equipment.

a. The publication of articles and advertisements calling on manufacturers of munitions and all goods necessary to the successful prosecution of the war to use gaseous fuel and speed up output

b. The publication of special issues of "A Thousand and One Uses for Gas," dealing with every kind of munition of war (not merely guns and shells), and of speeches made by experts before meetings of learned societies.

c. The issue (through the monthly *Bulletin*, etc.) of appeals to gas managers to arrange exhibitions and demonstrations of gas furnaces, etc., in showrooms, works, and other suitable buildings in manufacturing districts.

d. The furnishing of useful and important information to the Ministry of Munitions, manufacturers of munitions, etc.

B. War Economy.

1. *Fuel.*

a. The furnishing of information to various government departments as to the advisability (from the point of view of national fuel economy and the recovery of valuable by-products) of using gas for every possible purpose in factories, government offices, etc., which information later became the basis of several governmental pronouncements on the subject of fuel economy (*e. g.*, with special reference to immediate needs, and also with a view to the larger question of conservation of the world's coal supplies, by economical use, recovery of by-products, etc. This is a natural continuation of the policy of the Association in assisting by all means in its power the influential smoke abatement campaign).

b. The publication (in the *Bulletin*, etc.) of appeals to gas managers, asking them to do their full share in the recovery of benzol and toluol. (This was left optional by government —certain concessions as to tests, etc., if done.)

c. The publication of special articles, advertisements, and letters explaining the new calorific standard and its effect on the public gas supply.

d. The preparation and publication of special "fuel economy" advertisements and pamphlets urging, among other points, the careful reading of the meter.

e. The establishment of contact with public men billed to speak on "Fuel Economy" or other topical subjects, by sending them well in advance reliable matter regarding the use of gas.

(This is a continuation of the Association's pre-war policy of never losing an opportunity of educating influential and unbiased public opinion.)

f. The despatch of specially prepared letters to professors of science throughout the Kingdom offering to supply them with literature relating to the most recent developments in the science of gas manufacture, supply, and application to industry.

g. The publication in educational papers of a special series of "Teachers' Notes for Lessons" on the Domestic and Industrial Uses of Gas—a

continuation of a pre-war series on the manufacture, distribution, and use of gas —intended to educate the country's future housewives, scientists, and industrial workers in a proper appreciation of the value and economy of gas.

2. *Food.*

a. The issue (in the *Bulletin* and by letter) of appeals to gas managers to arrange demonstrations, exhibitions, etc.

i. At the beginning of the war, in co-operation with any local committee undertaking economy propaganda; and later

ii. During the time of the submarine menace, in co-operation with the Government's War Savings Committees working in conjunction with the Food Controller and his staff. (See *d* below.)

b. The publication of special articles and advertisements appealing to the general public in connection with *a* above.

c. The organization of special publicity campaigns—for example, the publication in the general press of advertisements setting forth the advantages of home-made bread and offering special pamphlets on baking bread in the gas cooker. Also the preparation on behalf of gas managers of schemes for the practical prosecution of these campaigns in their respective districts.

d. The co-operation of the Association's whole organization with the Food Controller and his staff (with his approval) in the following ways:

i. By the publication of advertisements co-ordinating fuel and food economy.

ii. By the issue to Association members of a specially drawn up circular containing suggestions as to assistance to be given by them either on or through local War Savings Committees.

iii. By the issue of a special "Communal Kitchen" number of "A Thousand and One Uses for Gas."

iv. By the publication of special pamphlets drawn up for and with the approval of the War Savings Committee, and adopted as government pamphlets.

3. *Life.*

a. The publication of articles, pamphlets, and advertisements in medical, municipal, professional, and other papers on—

i. The housing of workers.

ii. Welfare work in factories and workshops.

iii. Refuse destruction and fly peril.

iv. The Smoke Abatement Campaign and the use of gaseous fuel.

b. Active co-operation with infant welfare authorities generally, and in particular with the National Baby Week Council in the following ways:

i. By the issue of appeals to managers to assist in the work of local advertising, etc., in preparation for "Baby Week" (July, 1917).

ii. By supplying the Baby Week Council's special literature to gas managers and asking them to keep it in their showrooms.

iii. By drawing up and publishing special advertisements and in particular a "Baby Week" gas pamphlet "Safeguarding the Babies." This was also published *in extenso* and well in advance in the leading educational papers, as the basis for lessons by domestic science teachers during "Baby Week," and quantities offered to teachers free of charge for distribution to older girls to take to their homes for further study, both for essay writing and for influencing parents and others on the vital question of "saving the future" at a time when we are against our will obliged to destroy life in this generation.

Nowadays Patriotic Window Trims Catch the Eye.

The Sheboygan (Wis.) Gas Co. installed a patriotic window display during Hot Water Week, as may be seen in the picture on this page. The cannon which, of course, is the center of attraction was made with the Pittsburgh automatic, mounted on wheels, covered with red, white and blue bunting. During Hot Water Week, A. F. Davey, manager and C. A. Pepper, new business manager, conducted a direct mail campaign and sold 18 automatic

Patriotic Window Put Out by Sheboygan Gas Co.

Decatur Can't Quit

Second 1917 Water Heater Sale Proves to be Larger Than the First

During the week of May 28 to June 2 the Decatur (Ill.) Railway & Light Co. ran a campaign on Ruud automatic heaters only, and were successful in selling twenty-two automatic heaters. It was the intention then to run another water heater sale July 16-21 and push the selling campaign on the No. 25 Ruud tank heaters, which the company has been doing each year for the past three years, and also sell the automatic type of heater generally at the same time. This second campaign was more successful than the first.

In lining up the campaign advertising it was found pretty hard to prepare combination advertising without featuring the automatic. The Ruud company sent in four men, Messrs. Ward, Clark, Purnell and Singer, who is the Ruud representative. The advertising scheme that was carried through both on teaser ads. which ran the week previous to the campaign, and the newspaper advertising which ran during the campaign, featured the Ruud page boy with a megaphone which carried the different announcements such as "Hot Water Week Is Coming," "This Is Hot Water Week," "You Can Afford Hot Water," and "This Is Your Last Chance." The banners used on trucks the first week featured the page boy and they were used again the second week. In hooking up the advertising campaign this way it attracted quite a great deal of attention.

With the assistance of the Ruud men and one of the local men to act as a guide, they went out and worked in the city in the morning and talked to the housewives. In the afternoon they made the downtown calls talking to the husbands of the wives they had talked to in the morning and in this way were very successful in closing the sale for the heater. One of the Ruud men stayed on the sales floor all the time during the sale so that when anyone came in the office they were assured of getting prompt and efficient attention if they were interested in water heaters. The company also had a No. 4 Ruud heater connected up on the sidewalk in front of the office with a sign on it reading, "Turn the faucet, see the hot water flow. Special demonstration inside." In having the heater on the sidewalk it attracted a lot of attention and the office was successful in making four or five sales from this display.

"It might be of interest to know the cost for newspaper advertising on a campaign of this kind," said Commercial Manager W. D. Moore, after the campaign. We have gone into the cost of advertising and find that for the

W. D. Moore.

number of heaters that have been sold so far this year on our two campaigns the advertising cost approximately $8 per heater. The representatives from the Ruud company cost us nothing.

"On Monday we sold three Ruud automatic water heaters which was the lowest number that was sold any one day, and on Saturday we sold fourteen which was the highest, winding us up with a total number of thirty-two Ruud automatic water heaters and twenty-eight No. 25 Ruud tank heaters. You will notice from the figures above that we sold more of the automatic heaters than of the tank heaters. The reason for this was that in talking to a consumer it was pretty hard to talk the two heaters at the same time without interfering with the sale and for this reason after we got started and had run the campaign a few days we talked nothing but automatic heaters.

"When you stop to consider that this second campaign was run so close to our first one, we think that you will agree with us that it was a success from every standpoint. For the past five years we have averaged about ten automatic water heaters a year while this year with the two Ruud water heater campaigns we have sold fifty-four Ruud automatic water heaters. In addition to the fifty-four Ruud heaters we have sold seven No. 65 Pittsburg heaters and two No. 30 Humphrey's automatic heaters. The heaters were sold on the payment plan, allowing the consumer twelve months to pay for it with no discount for cash. Some of the heaters sold on our first campaign that were sold on the payment plan are all paid for now, which shows that if the consumer is entirely satisfied with the heater he disregards the payments and cleans the whole thing up in from one to three months."

Long Island High Pressure Lines Opened.

The Long Island (N. Y.) Gas Corporation has completed its high pressure lines from Sag Harbor to Bridgehampton and Southampton, the necessary distribution mains have been completed and gas turned into the system. The first meter was installed at the Irving Hotel in Southampton on July 23d. This hotel's equipment includes two sections of hotel units, one hotel broiler, one four-shelf pastry oven, one large plate warmer, one 5-gallon coffee urn and one food warmer heater by two Vulcan burners. Their consumption averages 2,000 cu. ft. per day. Another large installation was the Southampton Canning Depot, whose equipment includes fifteen 2-burner Vulcan hot plates and one No. 423 Vulcan water heater. The consumption here will average about 25,000 cu. ft. per week. The company has also connected up three smaller hotels and many private residences.

Gas Company Outing At Springfield.

The tenth annual outing of the men connected with the Pittsfield Coal Gas Co. was held August 11th, at Riverside Park, Springfield, Mass. The party went by train and auto to Springfield. At Riverside Park the annual interdepartment ball game was a feature of the morning's program. After the game the big artificial swimming pool was a popular place with both players and spectators. Instead of a clam bake the main event of the day's activity this year was a chicken dinner. It was served at the park restaurant. From the soup to the apple pie and ice cream everything was of the finest and most palatable. The dance hall, roller skating rink and all the midway features were thoroughly "done" by the party. Many of the members remained in Springfield over Sunday.

Southern Gas Plants To Profit From New Industries.

The United States Steel Corporation is to build a big plant at Mobile, Ala., and Cramps are to erect a mammoth shipbuilding yards at Jacksonville, Fla. This should mean big increases for both the Mobile and Jacksonville gas plants.

OPINIONS *AND* COMMENTS

CONSERVE FOOD.

The several hundred gas companies that are engaged in the highly important work of spreading the preserving and canning food campaign may justly feel proud of their patriotic activities. There is not on record a movement pertaining to the war that has achieved a success more complete than this one of the American gas companies, or one that will contribute a proportionately larger measure of vital aid toward the ultimate victory of the Allies. Millions of gas ranges in this country have been actively engaged for weeks now in the work of preserving the surplus food products for winter use, not only by the nation at home, but also by the nation's armies in the trenches.

It now becomes the imperative duty of each individual in the gas industry to join the national movement to prevent waste and conserve the supply of food products that have been thus saved, along with other products of present daily consumption. Each man should see to it that his own personal waste of food is eliminated at once, and that his family's neglect in this respect is remedied without delav. It does not need statistical evidence now to convince us of the necessity for this course. Every sane man realizes it fully. Every loyal and patriotic man will act accordingly.

A DETERRENT INFLUENCE.

Utility commissions do not seem to grasp the present great need of encouraging gas companies, complains one of our readers. "We have been harassed during the past year by high prices and shortage in both the labor and material markets," writes our correspondent, "and, on top of all this, our commission seems reluctant to sanction any new financing, such as is essential if we are to serve our community properly. We can't understand this attitude. Our company always has been progressive and popular. Yet the commission seems to think we never need money, either to reimburse for past development or provide for future growth. There might be some encouragement in the present outlook for the gas business in our city if the commission were inclined to help, instead of hinder and retard. After several months of hard work, during which we were subjected to cross examinations that a burglar would resent, our bond issue finally was approved—subject to every restriction that the commission's experts could devise. By that time prices had so advanced that our original estimates for the work were obsolete. Now, the improvements either will have to be abandoned and the community suffer, or we shall have to go through another battle with the commission. I find lots of gas men, today, who'd rather let things drag along than fuss around with a commission for months to get through a legitimate appropriation for improvements and extensions."

DOCUMENTARY EVIDENCE.

This is what the Gas Age says we said:

"We note that the editor of 'The Gas Man's Newspaper,' of Chicago, refers to anyone who advocates holding conventions under present conditions as 'a rather poor sort of patriot.'"

And this is what we said:

"PUT SELF ASIDE.

"This is no time for selfish motives. The gas man, whether he be editor, operator or employe, who can't suppress his mercenary ego long enough to let the industry and the government concentrate a few months on winning the war, is, in our opinion, a rather poor sort of patriot."

Draw your own conclusions and read what else the Gas Age says about us—that is, if you have nothing else in particular to occupy your time and attention these busy, exciting days.

GAS LIGHTING SEASON.

Summer, with its long lines of daylight hours, has reached and passed its maximum strength. It wanes, visibly. Autumn is coming up with ever-lengthening strides and its Twilight Legion, dark visaged under waving plumes of black, is already at grips with the rear guard of the retreating season. The progress of Night in the domain of Day is not to be checked. It is irresistible.

Nevertheless, its attendant difficulties and inconveniences are easily met and overcome. There is a bright side to the gloomy picture of this invasion. The hosts of gas lighting will get into action now and the horrors of darkness will be dispelled. Gas light, then, may be carried into the figurative conquest of daylight as the non-combatant but highly necessary Red Cross, binding the wounds and alleviating the distress of the vanquished hosts sunlight. It is a noble work and its devotees glory in it.

The time is just now ripe to prepare for the 1917 Big Push. Every literal and imaginative sign points to big doings this year. Read in this issue the report of the N. C. G. A. Illumination Committee. Read the article on the Chicago gas lighting situation, which shows what one unit in the great national organization has accomplished in the way of rescuing exhausted victims from the hands of the enemy and restoring to them their natural

The GAS RECORD

MONADNOCK BLOCK, CHICAGO, U. S. A.

W. H. Graffis . . . . . *President*
H. D. Fargo . . . . . *Vice-President*
H. B. McMeal . . . . . *Secretary*
Herbert Graffis . *Treas. and Adv. Manager*
Milt Saul . . . . *Vice-Pres. and Editor*
Walter V. Turner . . . *Technical Editor*

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THE GAS RECORD is issued the 2nd and 4th Wednesdays of each month. Copy can be accepted as late as the Monday previous to each issue. Where proof must be seen, allow ample time for transmission in the mails.

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Full Page, per issue . . . . :	$40.00	$46.50	$50.00	$54.00
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Fourth Page, per issue . . .	12.00	14.50	16.00	18.00
Eighth Page, per issue . . .	7.00	8.00	9.00	10.00
Sixteenth Page, per issue .	4.00	4.50	5.00	6.00

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Vol. 12 No. 4 CHICAGO August 22 1917

comforts and conveniences in the shape of gas arcs.

These are thrilling tales of illuminating victories, and they will inspire any man who has a strong grip on his energies and a right way of thinking.

COAL TAR PRODUCTS.

The attached memorandum from the British "Gas World" is a vivid description of conditions now prevailing in England in regard to the production of war munition materials by the gas works. It is so nearly a description also of the conditions in this country at the present time that we feel it necessary to call it to the attention of engineers in the gas industry. Major Burns, of the U. S. Ordnance Department, has on more than one occasion called attention of the industry, and likewise of the public service commissions, to the scarcity of ingredients for high explosives. Let this view of British conditions serve as an example and a warning to us:

"An important notification has been issued by the Ministry of Munitions to the gas industry, in nullification of the water gas instruction, which was aimed at economizing coal. It is now stated that reasons have arisen for securing the maximum quantity of coal tar products, wherefore the Ministry urges that 'all carbonizing plants at gasworks be worked to the fullest extent.' It is added that the Controller of Coal Mines will cooperate with the Ministry of Munitions in this matter, giving instructions for all necessary coal to be delivered to gasworks for the purpose—which is good tidings. But with all the goodwill in the world, it will be impossible for many gasworks to increase their coal carbonization at this season, when the annual repairs and reconstructions are, or should be, in full swing, and it is imperative that a sufficiency of sound plant should be husbanded for the winter. It is not merely a question of coal supply, but even more of getting the works in proper order for the carrying on. Every imaginable difficulty and hindrance is being experienced in regard to repair and maintenance works, whilst new and extended plant and machinery is practically unobtainable, regardless of price. Of course, the gas industry will do its utmost, as usual, to satisfy the new requirement thus sprung upon its resources; but it is rather at sea for the moment as to what may be possible of accomplishment, even if there were no uncertainty as to what is desired of it."

SERVING UNCLE SAM.

The gas industry has good reason to feel proud of the number and the character of its men who have responded to the nation's call to military service. In spite of the fact that a large percentage of these men who have entered the service were eligible for exemption by reason of the work of necessity they were performing, they have managed to fill their places with others not liable for military service and have bravely gone forward in the great adventure of war, many of them in places of high responsibility and all of them eager to perform whatever task befalls him to the best of his ability.

It is not stating it too strongly to say that each man who has gone into the service under the conditions named above is a genuine hero. He has elected to fight for his country, when he might have stayed at home with all honor to himself for the work which "is in the maintenance of national interest." There is not at present any means for determining just how many men have taken this heroic action, but it is known that there are hundreds and perhaps thousands of them.

Let us who must remain at home for definite reasons keep before us at all times the noble sacrifice our fellow workers and associates have made; and to show due appreciation of their heroism let our duties be performed hereafter with increased ardor and efficiency, in order that their sacrifice may not be in vain.

EDWARD N. HURLEY ON TRADE JOURNALS.

"American business men do not realize the value which trade journals and technical magazines may be to them in increasing the efficiency of their factories and in giving them a broad and comprehensive view of their business. Our foreign competitors read almost every article published upon their business with great care and thoroughness. Many of them have duplicate copies of their favorite trade paper sent to their homes so that they may read them away from their business without being disturbed. Many foreign manufacturers contribute articles to these journals on phases of the business with which they are most familiar. Such articles are bound to be helpful and have a constructive effect. Our trade journals and technical papers are the best in the world and they should be encouraged and supported by our business men. Copies should be placed where employes can see them and they should be urged to read and study them. These papers are preaching the gospel of sound business on practical lines and are helpful not only to business but to the country as a whole. If the suggestions made by them in the past had been followed by our business men it would not be necessary at this time to point out some of the fundamental weaknesses in American business."

ADVERTISING PUNCH.

The enormous success attending the advertising campaigns of the gas water heater manufacturers, in the technical journals, the daily newspapers and weekly periodicals, proves conclusively that big investment in advertising is sound business policy. Just at this period, when the advertising of practically all of the manufacturers in this line is at a climax, we know of no commodity in this country that is moving from factory to consumer in greater proportionate volume, nor do we know of any line of industry in which there is a larger measure of prosperity and a greater degree of general satisfaction than there is in the gas water heater industry just now.

It is all due, of course, to the men of action who are the heads of these enterprises. Nevertheless, one of the main lines of activity among these men is that of publicity—advertising with a punch in it. They recognize advertising in their annual budget of expense. They put it on their pay rolls, and it brings home the business.

For convincing proof that advertising punch does pay, just follow the daily reports of gas company campaigns, large and small, that are now being continuously waged throughout the country in the interest of the gas water heater.

ABOUT MEN YOU KNOW

E. H. Collins, contract agent for the Illinois Northern Utilities Co., at De Kalb, Ill., will become manager of the Greenville (Miss.) Gas Co., on September 1.

I. S. Hayden of Hoopston, Ill., has accepted the position of manager for the Manhattan Gas & Electric Co., Manhattan, Kan. Mr. Hayden succeeds E. A. Wright, who resigned several weeks ago.

Among the leaders of the draft army are two to whom keeping the Kaiser in hot water will be old stuff. Tom Grant and Milton Cosgrove, both salesmen of the Humphrey Co., have been awarded commissions as captains as a result of their work in the officers' training camps.

"Bill" Powers, the industrial gas engineer, is much in demand these days. He is preaching "make money from your plant by keeping it at its peak with industrial gas," and showing those who heed his advice how to add the industrial load. Powers was the pioneer in supplying moderate sized gas companies with expert industrial solicitation and has served about fifty properties profitably.

John McGuinness, superintendent of the Suffolk (Va.) Gas-Electric Co., has joined the U. S. Naval Reserves.

R. E. L. Mann now is manager of the Palatka (Fla.) Public Service Co., and C. B. Marvin, superintendent.

The contest for the Insull Golf Cup continues fast and furious among the Peoples Gas men. Charlie Luther trimmed his brother; Ivan Hoy, the heavyweight champ was torpedoed by Jagade, the flyweight star; Ellis, Davies and Lester also eased into the 19th hole as winners.

Jos. C. Markley, of Dawes Bros., now is trying his hand at the "gentleman farmer" business, having moved from Evanston to Hubbards Woods, Ill.

W. S. Rosenthal, advertising manager of the Estate Stove Co., has entered the Reserve Officers' Training Camp.

The Doherty Roll of Honor lists the Doherty organization men who have enlisted. It is a roster that does the company proud. From ash handlers to the star salesmen of the bond department, Doherty men have jumped into the service. The Roll of Honor was recently sent out as a supplement to the Doherty News.

Lieut. Walter Hinman, well known to the gas fraternity, through his work in Calorimetry while associated with the American Meter Co., has been in government service for some time, and on August 1 was ordered to act as inspector of ordinance in the plant of the Remington Arms Co., New Haven, Conn. He is the ranking officer at this plant and his friends will be glad to learn that he has lost neither weight nor enthusiasm in his new field of work.

J. H. Prior, chief engineer of the Illinois Public Utilities Commission, has resigned and will open an engineering office in Chicago.

Frank G. Hayward, president of the Bristol Mfg. Co., Bristol, Conn., from 1902 until January, 1916, died at his home in that city, August 1, after a long illness, aged 76 years.

John B. Redd, sales engineer for the Davis-Bournonville Co., of New York and Chicago, is in Los Angeles to establish a Pacific coast branch for the company. Incidentally he is renewing the many warm friendships formed during his administration as superintendent of the gas exhibit at the Panama-Pacific exposition.

E. W. Bennett, of the field force of the Alden-Batavia Natural Gas Co., Batavia, N. Y., recently was badly burned in an explosion.

Walter T. Schutt, New Business Manager of the St. Clair County Gas & Electric Co., at East St. Louis, recently spent a short vacation at Chicago, and Madison and Beloit, Wis. Mr. Schutt's efficient organization has been doing splendid work in all the towns covered by his company, but now is losing some of its best men for military service.

Oscar A. Koter, of the office force of Helme & McIlhenny, Philadelphia, has been in service as a drill sergeant at the Fort Niagara training camp and is now commissioned as second lieutenant, infantry section, Officers Reserve Corps.

Clare N. Stannard, secretary of the Denver Gas & Electric Light Co., was a delegate to the recent National Convention of Rotarians at Atlanta, Ga.

J. H. Vierieg has been appointed superintendent of the gas plant of the St. Cloud (Minn.) Public Service Co. to succeed H. G. Williams who resigned some time ago. Mr. Vierieg has been with the St. Paul Gas Co. Jerome Spiering who has been in charge of the local plant temporarily has returned to Brainerd to take charge of the plant there.

J. C. Sloan, manager of the Port Huron (Mich.) Gas & Electric Co., for 17 years, has resigned, owing to ill health. He will be succeeded by Benjamin Crahan, of Joplin, Mo.

Another flock of attractive and convincing mailing cards and folders has been engaging the attention of Public Service consumers throughout New Jersey of late, due to the efficiency and talent of New Business Manager Hanlan's staff at Newark. The series embraces descriptive literature, handsome colored illustrations and cuts of practically every line of gas appliance used in domestic service. For direct, hit the mark publicity, this lot of literature has seldom been equalled in the gas field.

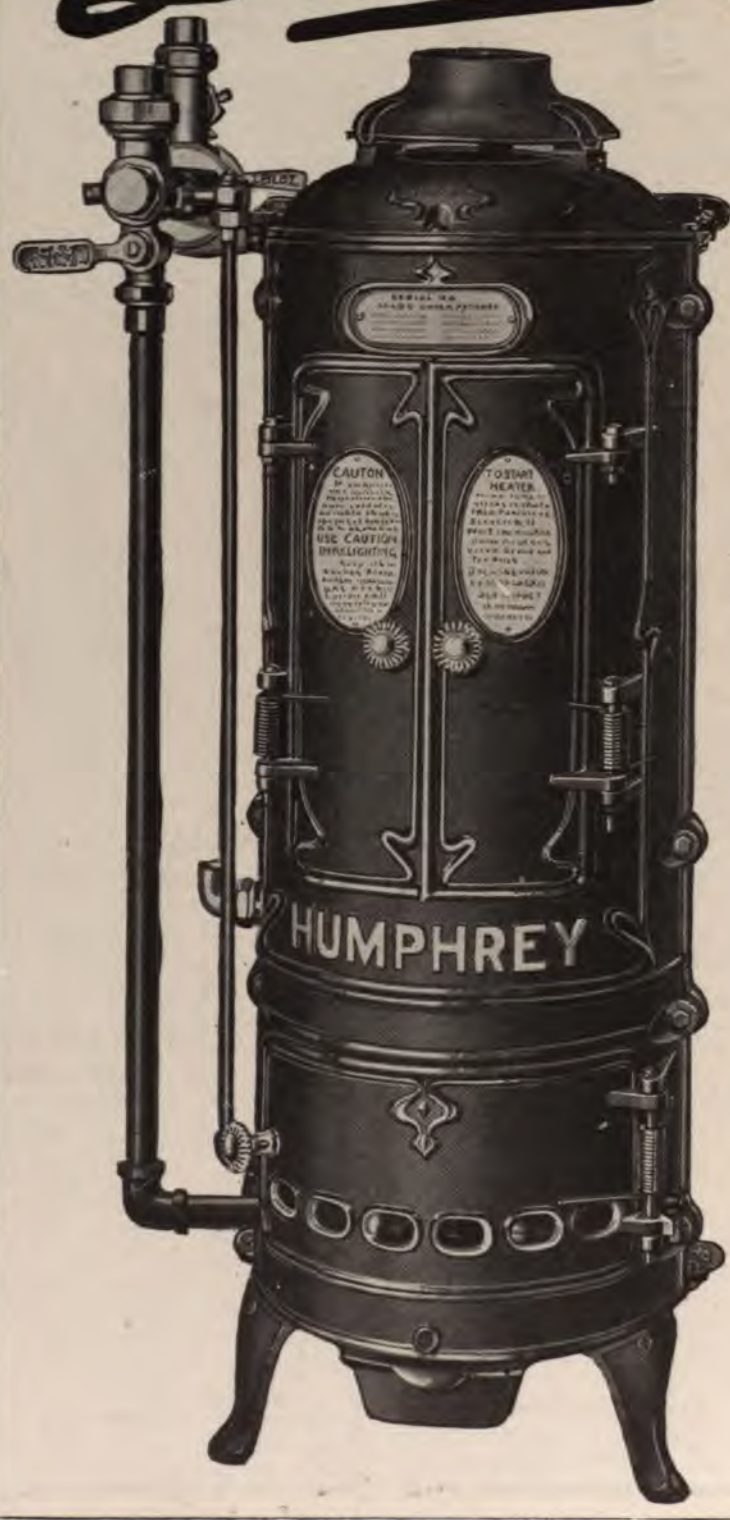
TEXAS MEETING.

Second Annual Convention at Dallas, October 16 and 17.

The second annual convention of the Texas Gas Association will be held in Dallas, October 16th and 17th, at the Adolphus hotel. A number of very interesting papers have already been promised, and all indications point to a large attendance. The latest bulletin from the association says:

"The war has brought the gas companies of the country face to face with some very vital problems, such as labor conditions, cost of raw materials, etc., and it seems very timely that the gas men should get together and discuss these problems with a view of working out a possible solution. No doubt you are vitally interested in these problems, and your counsel and advice will be greatly appreciated by your fellow gas men."

Last Call for



HUMPHREY

Automatic

Gas Water Heater Week

Sept. 8th to 15th

Executives, Sales and Department Managers —NOW is the time for action.

If you haven't already made application for HUMPHREY Advertising and Selling Co-operation for the BIG SALE do so at once.

The number of Gas Companies we can effectively work with is limited.

We Can Only Take on a Few More Towns

—and when these few towns are gone our offer will be withdrawn.

If you want to get in on a proposition that delivers 52 weeks' business in one week, we urge you to write or send coupon immediately.

We have the most complete Sales Helps and Co-operative plan that any manufacturer of a heating system ever inaugurated—window trim, display cards, booklets, moving picture slides, newspaper advertisements and many other selling helps, including personal services of our own sales force.

DON'T MISS IT. Get the information quickly—then decide. Write today.

HUMPHR

KALAM

the Big Sale

The success of HUMPHREY Hot Water Week is certain.

We are backing this sale in a tangible way that will unmistakably awaken the interest of every possible customer before the sale begins.

Quarter pages, full page and double page advertisements will appear on Sept. 1st and Sept. 8th in the Saturday Evening Post and Literary Digest.

These advertisements will specifically call attention to HUMPHREY Automatic Gas Water Heater Week and to the fact that Special Inducements will be offered by the local dealer.

These ads will bristle with persuasion. They will make every home owner realize the need of such hot water service as is furnished by the "HUMPHREY."

The result is, your prospects will be ready and willing to be "shown" and sold.

This campaign on the

HUMPHREY
AUTOMATIC
Gas Water Heater

is destined to bring in a greater amount of business than was closed in the Spring drive—when more sales were closed—and more profits made—than ever before in a single campaign.

Get in on it!

In offering HUMPHREY Automatic Gas Water Heaters to your customer you have something besides mere "talking points" to use as sales arguments.

There are fifteen distinctive points of merit—actual provable superiorities in the "HUMPHREY" that will win the order.

The "HUMPHREY" is in reality the best gas water heater on the market. It is a mechanical masterpiece. Has every modern improvement, including a highly perfected valve, and burner and pilot which make satisfactory service and pleased customers a certainty.

The "HUMPHREY" line is complete—there is a size and type for every need. Thousands of customers in all parts of the United States testify to their unparalleled merit and incomparable service.

NOW—

Write or Mail Coupon

at once and get particulars regarding HUMPHREY Automatic Gas Water Heater Week.

The coupon is placed here for your convenience. Use it and see what HUMPHREY Advertising Service consists of. We will give you facts and figures which will be mighty interesting. For good business reasons, send for this information.

Send Now

HUMPHREY COMPANY
Div. Ruud Mfg. Co.
Kalamazoo, Mich.

Please send us full particulars of Humphrey Automatic Gas Water Heater Week and how to cash in on your National Advertising.

Name .....

Address .....

City ..... State .....

OMPANY
COMPANY
HIGAN

NATURAL GAS DEVELOPMENTS

One Toledo Concern Uses 80,000,000 Cu. Ft. of Gas Monthly.

The Toledo Railways & Light Co., a Doherty subsidiary, has been supplying the Willys-Overland Automobile Co. with about 15,000,000 cu. ft. of gas per month for the last three years, and before long it will be furnishing between 60,000,000 and 80,000,000 cu. ft. a month.

First Gas Is Found in the Northwest.

The Spokane-Benton County National Gas Co., of Spokane, Wash., owns the first commercial natural gas well in the northwest. The well is only 706 feet deep and flows over a million feet a day and at the very top of the anticline is a pond of water that stays the same depth the year in and year out, which is covered with an oily scum, from which an analysis of petroleum has been secured. Three rigs are now at work in the field and two more will soon be at work. The company is asking for a franchise for the city of Spokane, 70c per thousand. The field is 120 miles from the city with a good country to retail the gas in all the way. It has also applied for about twenty franchises on or near the route of the main pipe line. H. C. Harris is president.

Grant Higher Natural Gas Rates in Kansas City.

By a decision of the Federal Courts announced on August 1st, higher rates for natural gas are granted in the vicinity of Kansas City. Under the new rate schedule, natural gas is to cost $0.60 per M cubic feet North of Ottawa, Kansas, which district included Kansas City. The territory South of Ottawa will pay $0.50 per M cubic feet for gas. Henry L. Doherty & Co. controls the natural gas interests in that neighborhood and according to the new rate revisions, that company is to receive 57½ per cent. of the gross income.

Natural Gas Plant at Cambridge City, Ind., Sold.

The Cambridge Natural Gas Co., of Cambridge City, Ind., has been sold to A. B. Ayers, of Fortville, and F. M. Milikan, of Indianapolis.

Springfield Working To Avoid Shortage.

That the Springfield (Ohio) Gas Co. is rapidly carrying out its improvements to increase its facilities has been announced by Manager Charles E. Ashburner. The auxiliary line west of the city has been completed and the company has laid a pipe line in Plum street. When the company connects up the storage tank in the western part of the city it will have completed its improvements made under an agreement last spring with the city. Every effort is being made to guard the city against a natural gas shortage next winter.

Auburn (Wash.) Gas Co. To Extend to Kent.

The Valley Gas Co. of Auburn, Wash., is planning to extend its gas service to Kent. The company makes wood gas.

Fifteen Mile Main To Be Laid in Ohio.

The East Ohio Gas Co. will lay a fifteen-mile 10-in. main between Newburg and Peninsula.

Gas at One Plant Increases 5,000,000 Cu. Ft. a Month.

The consumption of natural gas at the plant of the Libbey Glass Co., Sandusky, O., shows an increase of 5,000,000 cu. ft. for July over June. Two more work furnaces are under construction and when completed the increased gas consumption will be still greater.

California Gas Utilities Co., Incorporated at San Francisco.

The California Gas Utilities Co. has been incorporated at San Francisco, with a capital of $100,000, to deal in gas and electric appliances. The incorporators are W. M. Hunter, C. H. Mathison, N. Waldmeyer, J. A. Phelps, of San Francisco, and E. R. Ramsey, of Oakland.

Big Gas Well Struck in West Virginia.

A gasser flowing at the rate of 6,000,000 cubic feet a day has been struck by the Pittsburgh and West Virginia Gas Co. in the western part of Taylor county, W. Va.

Doherty Artificial Gas Sales Increase 5 Per Cent.

F. C. Weber, artificial gas engineer of Henry L. Doherty & Co., reports for the year ending May 31, 1917, that about one-half billion cu. ft. of gas were sold, not inclusive of Toledo and Warren, O. This represents an increase of 5 per cent. in the last year.

Gas and Electric Companies Casting About for Economies.

Up to last month the Missouri Gas & Electric Co., of Marshall, Mo., has got approximately 5 ft. per lb. of coal which cost $5.22½ in shed; the present price on same in shed is $7.50. The company's steam coal for the electric plant has in the past cost $1.95 in the shed, the same grade now costing $3.35 in the shed. The company is installing an ice plant and expects to use its exhaust steam to make ice and this way make more economy in operation.

This Missouri Case Typical of General Situation.

The Brookfield (Mo.) Gas, Electric & Heating Co. recently closed yearly contracts for steam coal, coke and gas oil for water gas manufacture at stiff advances over last year. Steam coal now costs the company $3.30 per ton delivered as against $2.40 last year, while coke costs $11.20 per ton delivered as against $7.70 last year. Gas oil is virtually a delivery contract only, as the sliding scale price is based on the price of crude oil and at present is $0.0525 per gallon against $0.0285 per gallon last year. Oil continues to go up and another freight rate increase has arrived which may help somebody—but not gas companies.

PETITION WITHDRAWN.

Indiana Gas Association Will Put Its Heat Unit Request in Another Form.

The Indiana Gas association has withdrawn its request to the Public Service Commission for permission to decrease the number of heat units of gas. It is understood, however, that the association will file another petition embodying virtually the same request, but it will be presented in another form. The original petition sought permission to decrease the number of British thermal units from 600 to 550. Individual hearings on the general request of the association will be given the company members of the organization, it is believed, so that the commission will follow the same method of procedure as in the request of the Indiana Electric association for surcharge rights.

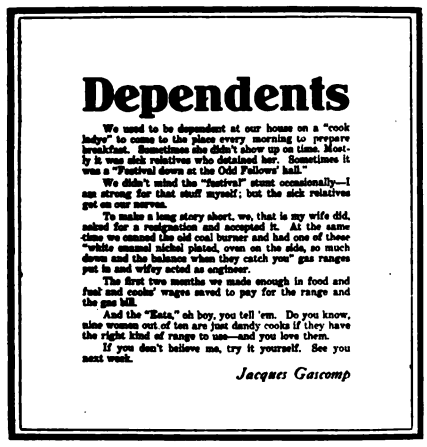
The position of new business manager of the Jefferson City (Mo.) Light, Heat & Power Co., formerly held by Norman Olson, has been filled recently by E. V. Pryor. Mr. Pryor was connected with the Illinois Traction Co. in campaign work at Peoria, Ill.

The Standardization of Benzol Works Tests.

By Thomas B. Smith, "Gas World" 66, Coking and By-products Section 11; (May 5).—The writer calls attention to the present lack of uniformity of the methods of making benzol tests in recovery plants. He takes up first the sampling of the gas which is to be tested for benzol and shows how the drop in velocity of the gas flow from the gas main through the sampling pipe may cause condensation of some benzene and consequent error in results. He describes a method of sampling which avoids this difficulty. He then describes what he considers to be an entirely satisfactory method of absorbing benzol in oil and the proper way to subsequently distil the oil to give reliable results. He supplements this method of determination with a chemical method for which he claims great efficiency. He concludes with some comments upon the proper way of reporting results. The paper was followed by considerable discussion by other chemists.—D.

CURRENT ADVERTISING REVIEW

A four-page letterhead of which the second and third pages are reproduced here is the attractive form in which the Pacific Gas & Electric Co. presents its water heater campaign. The first



Dependents

We used to be dependent at our house on a "cook lady" to come to the place every morning to prepare breakfast. Sometimes she didn't show up on time. Mostly it was sick relatives who detained her. Sometimes it was a "Festival down at the Odd Fellows' hall."

We didn't mind the "festival" stunt occasionally—I am strong for that stuff myself; but the sick relatives get on our nerves.

To make a long story short, we, that is my wife did, asked for a resignation and accepted it. At the same time we canned the old coal burner and had one of these "white enamel nickel plated, oven on the side, so much down and the balance when they catch you" gas ranges put in and wifey acted as engineer.

The first two months we made enough in food and fuel and cooks' wages saved to pay for the range and the gas bill.

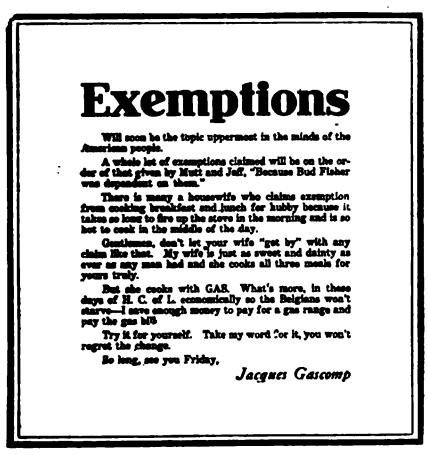
And the "Eats," eh boy, you tell 'em. Do you know, nine women out of ten are just dandy cooks if they have the right kind of range to use—and you love them.

If you don't believe me, try it yourself. See you next week.

Jacques Gascomp

New Idea by Rumbold.

page of the folder contains the typewritten letter. There is no filled-in salutation, the address being simply



Exemptions

Will soon be the topic uppermost in the minds of the American people.

A whole lot of exemptions claimed will be on the order of that given by Mutt and Jeff, "Because Bud Fisher was dependent on them."

There is many a housewife who claims exemption from cooking breakfast and lunch for hubby because it takes so long to fire up the stove in the morning and is so hot to cook in the middle of the day.

Gentlemen, don't let your wife "get by" with any claim like that. My wife is just as sweet and dainty as ever as any man had and she cooks all three meals for yours truly.

But she cooks with GAS. What's more, in these days of H. C. of L. economically so the Belgians won't starve—I save enough money to pay for a gas range and pay the gas bill.

Try it for yourself. Take my word for it, you won't regret the change.

So long, see you Friday.

Jacques Gascomp

Another Jax Ad.

"To Our Consumers." This saves money and as a form letter address fools no one, it entails no loss in effectiveness. The meat of the whole call for immediate action is embodied in this statement which is worth lifting for any appliance letter: "An offer of a $19 heater for $12.50 is necessarily subject to early withdrawal, owing to present market conditions and it may be years before another opportunity such as this occurs."

Allan Rumbold, commercial manager at Jacksonville, Fla., is the author of a series of ads that has much to commend it. The ads are signed "Jacques Gascomp" and under timely headlines, drive home the advantages of gas appliances. "Jacques" tells his stories in a natural way. The appearance of the ads is inviting. The two ads headed "Exemptions" and "Dependents" are representative examples of the series that had caused so much interest in the Florida city.

From New York and Baltimore we select two timely samples of good advertising. The Gotham subject is gas

A Gas Iron

has *many* merits

ONE of which is *Economy*

WHEN our representative calls on you please permit him to demonstrate the advantages of the Gas Iron. He will explain how you can do

Three Hours of Ironing For One Cent's Worth of Gas

In saving fuel the Iron pays for itself. You are saved hundreds of unnecessary and wearisome steps. Being *pointed at both ends* there is no lost motion in the use of this Gas Iron, as tucks, pleats, laces and lingerie are easily ironed

SOLD ON INSTALMENTS—Pay Our Representative 75c and 75c each month for the four following months when you pay your Gas bills.

The tubing accompanying the Iron is *aluminum* and cannot become accidentally detached. The Iron cannot become overheated. If our representative does not call to-day call up your Gas Office and ask to have a representative sent to you.

He can be identified by a metal badge that he wears.

"The Right Way is the Gas Way"

Consolidated Gas Company of New York

New York Gas Iron Ad.

irons, while the Maryland specimen deals with that nation-wide industry, canning. Why is it that so few gas companies hit the nail at the right time, as these two companies have done? In every other line of industry the seasonable advertising is a feature of prime importance. Why not in the gas industry? Let's all reform in this respect.

Barney Mullanev, head of the Peoples' Advertising Dept., has instituted joint meetings of the admen and the

All the Good Things of Summer

Put up at home on your Gas Range and stored away for Winter

What a sense of satisfaction there is in knowing that you have your own supply of canned goods!

What a pleasure it will be next winter to eat those fruits of summer, put up just as you like them!

Write or call for our folders that tell just how you can put up all kinds of fruits and vegetables at home on your gas range.

It's easy to do—a gas range makes it easy. A gas range keeps your kitchen cool and comfortable and supplies an even, easily regulated heat.

Gas is one of the few commodities that has not advanced in price. Make use of it to stock your pantry with all the good things of summer and save money.

LET ALL WHO CAN CAN CAN!

The Gas and Electric Co
Lexington Building

Good Canning Ad.

managers of new business divisions. Everybody is strong for the idea in Chicago. Mullanev is an ex-newspaper man, ad. agency head, politician, and with Weedon and Lindsay as staff officers will make these round table meetings mighty interesting and profitable.

Inside Pages of P. G. & E. Water Heater Letter Head.

Nathaniel Tufts Meter Works

455 Commercial Street

Boston

Established 1860

In New England there are ONE MILLION consumers GAS METERS.

35% or 350,000 are of the *Prepayment Type*

39% of our total meters sold in 1916 were *Prepayment*

We manufacture these under License from John J. Griffin & Company

McDONALD METERS

Noted for Accuracy

CONSUMERS METERS
REGULAR AND B TYPE

PREPAYMENT METERS
ADAPTED TO ALL REQUIREMENTS

STATION METER WORK
OF EVERY DESCRIPTION *with* A SPECIALTY *of*
THE HINMAN MEASURING DRUM

D. McDONALD & COMPANY

991 BROADWAY, ALBANY, NEW YORK

The MARYLAND METER

B. METERS

FOR INCREASED CAPACITY
UNDER SLOW SPEED OPERATION

STATION METERS
METER PROVERS, COMPLAINT METERS, ETC.

ARTIFICIAL AND NATURAL GAS METERS
PREPAYMENT METERS

MARYLAND METER WORKS

BALTIMORE, MARYLAND

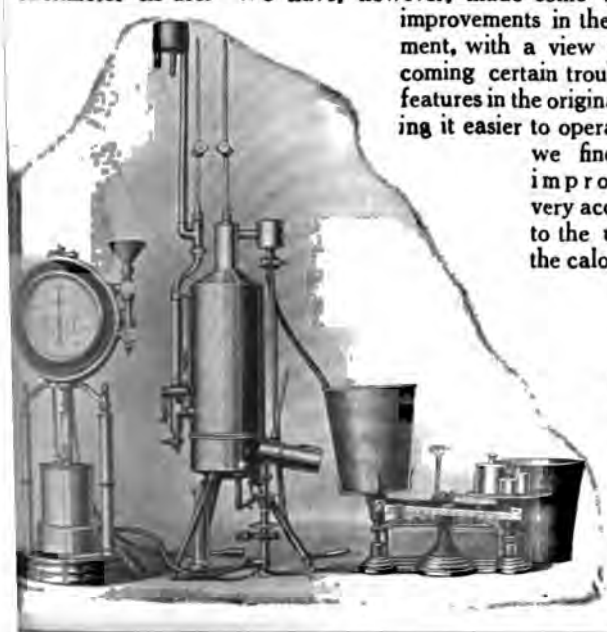
SPECIAL ATTENTION TO REPAIR WORK

NORTHWEST REPRESENTATIVES: NORTHWEST GAS EQUIPMENT CO.
1010 SPALDING BUILDING, PORTLAND, ORE.

The HINMAN-JUNKERS CALORIMETER

As manufactured exclusively by the American Meter Company

is of the same general design and operates on the same principle as the well known Junkers Calorimeter, which has heretofore been regarded by gas experts as the most satisfactory form of calorimeter in use. We have, however, made some valuable improvements in the instrument, with a view to overcoming certain troublesome features in the original, making it easier to operate, and we find these improvements very acceptable to the users of the calorimeter.



This Calorimeter, with its accessories, is constructed in accordance with the recommendations made by the Committee on Calorimeters of the American Gas Institute. It also has the approval of the Public Service Commission of the Second District, Albany, and has been found by them to give accurate results.

This Calorimeter is now furnished with baffle plates for burner, in accordance with the latest recommendations made by the Committee on Gas Calorimetry of the American Gas Institute and of the Bureau of Standards, Washington.

This Calorimeter is also now made so that it can be taken apart, making all parts accessible. Metal tubing is also used in making the connections.

Complete Details and Prices on Application

The American Meter Company

Established 1834

Western Office: Peoples Gas Bldg. Chicago

New York **Philadelphia**

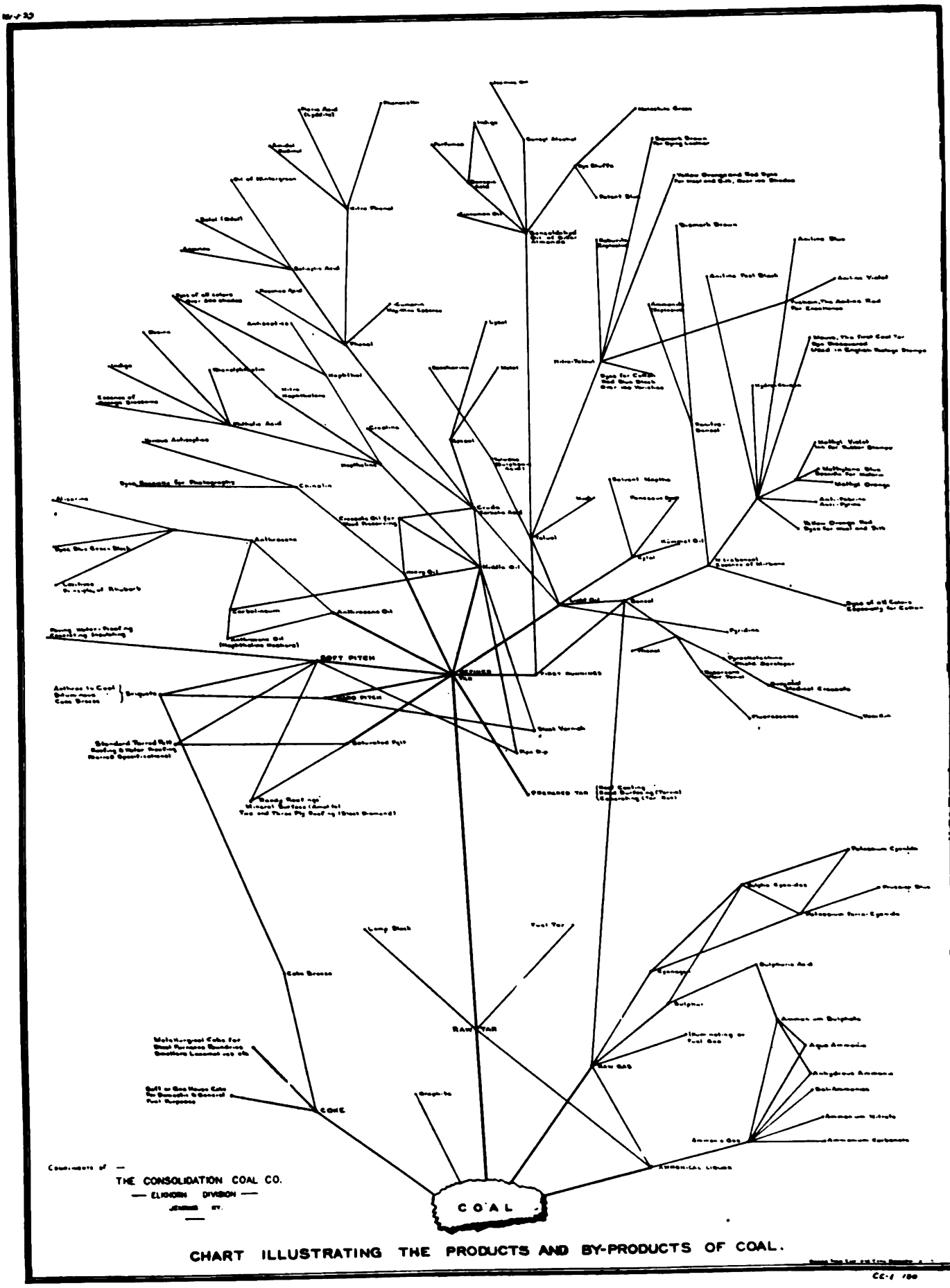


CHART ILLUSTRATING THE PRODUCTS AND BY-PRODUCTS OF COAL.

PROBLEMS IN THE GAS BUSINESS

Conducted by W. M. Henderson, Assistant Engineer Gas Department, Pacific Gas & Electric Co., San Francisco.

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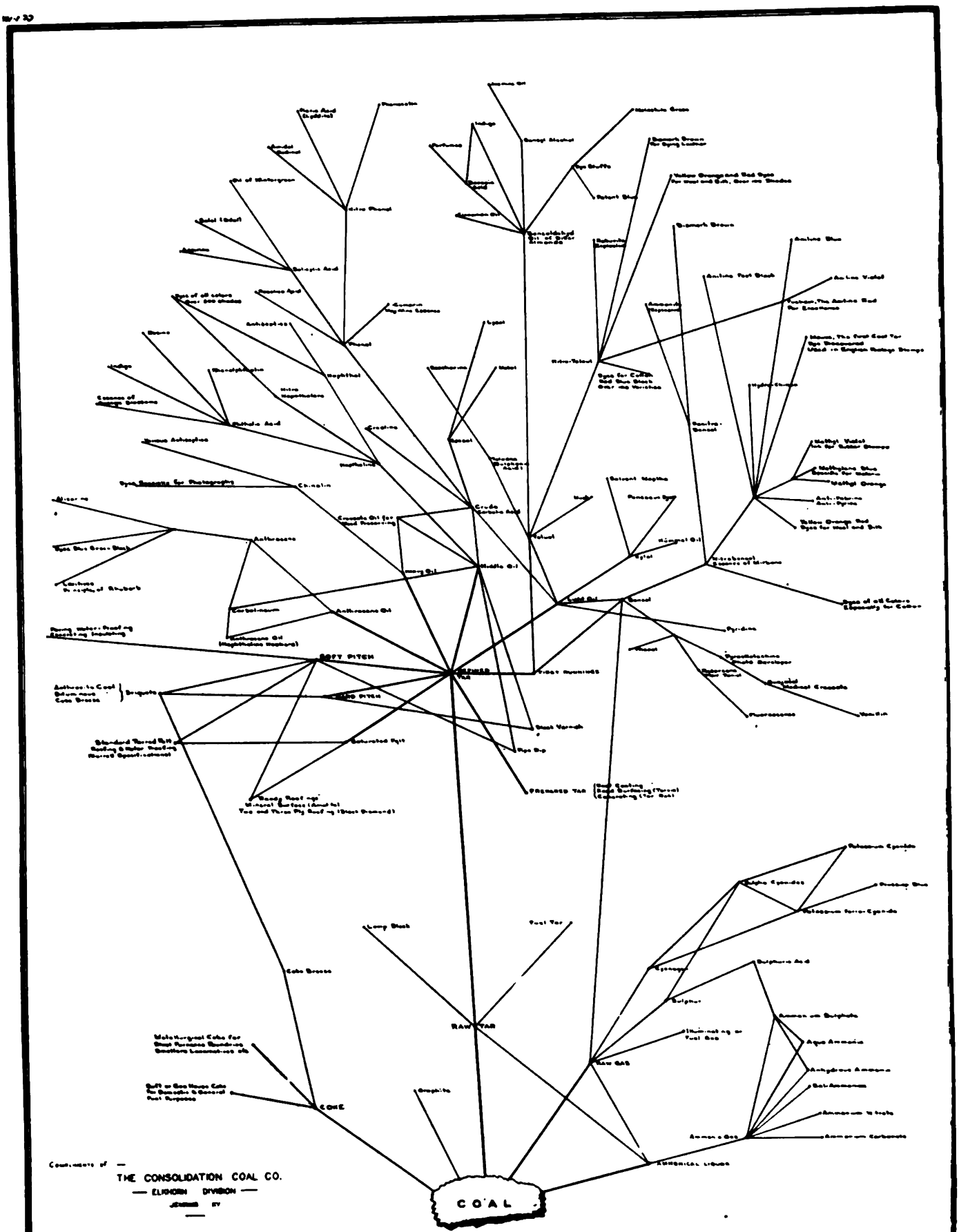

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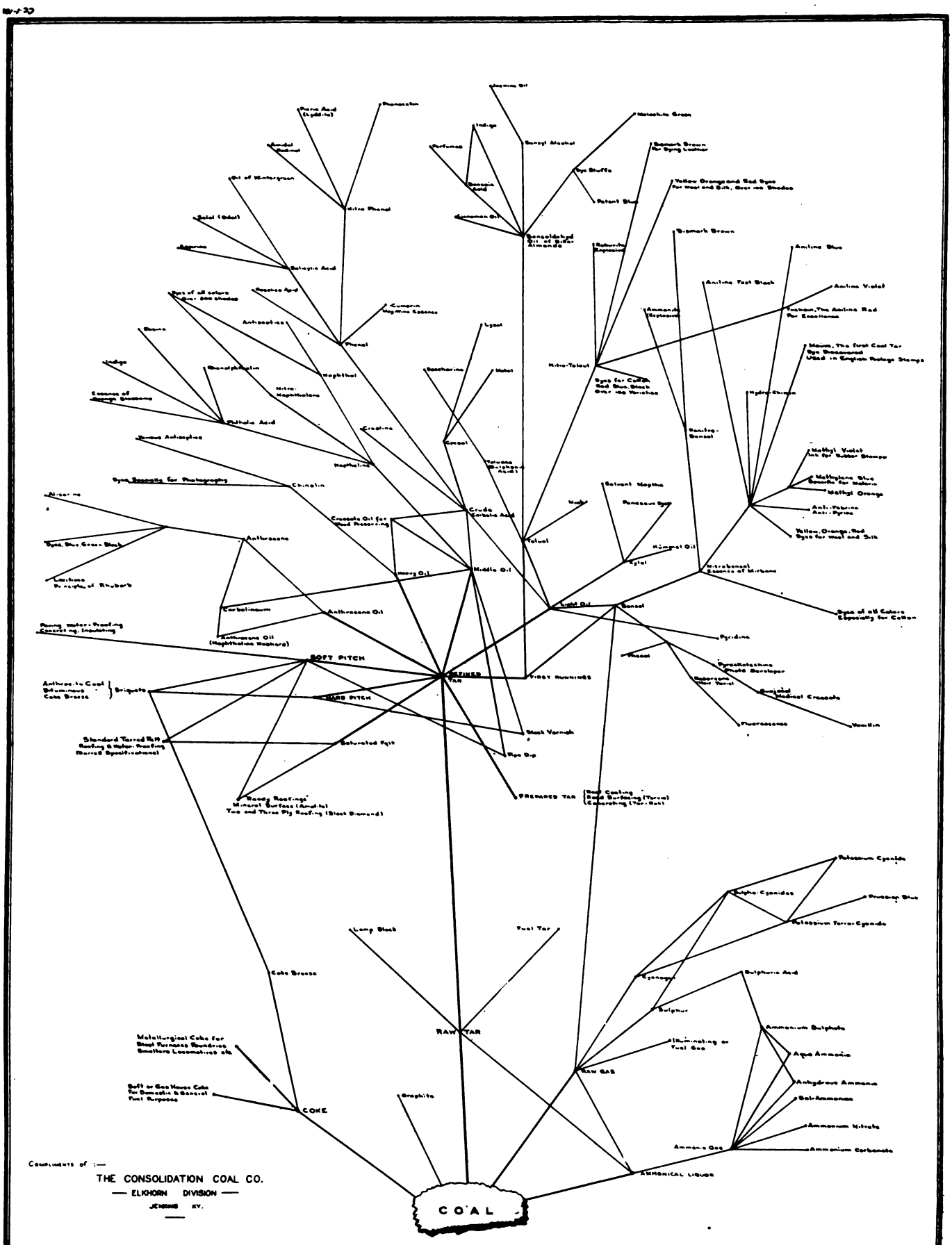

COMPLIMENTS OF :—
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The use of compressed gas is attended by one difficulty, the sudden lowering of the temperature, due to the expansion of the gas as it issues from the reservoir. With motor-car engines this should present no difficulty except during starting, as the heat from the exhaust could be utilized to meet the trouble. The heat from the exhaust also could be utilized, to a certain extent, to increase the power obtained by the consumption of a given weight of gas, just as the power available from compressed air is increased by heating it at the point of consumption. The motive power of the later forms of Whitehead torpedoes affords a striking instance of this.

The use of compressed gas would enable the carburetor to be dispensed with, which would in itself be a boon; a large proportion of the troubles with gasoline engines are due to the carburetor.

This department will supply information on problems arising in every department of the gas industry. Your co-operation is solicited, both in asking and answering questions. Address: W. M. Henderson, Pacific Gas & Electric Co., 445 Sutter St., San Francisco, Calif.

NEW QUESTIONS.

229—Black Ammonia Salts.

How do you account for the black salt formation in sulphate of ammonia?

230—Oxide Purification.

Our oxide purifiers give us more trouble, due to back pressure, than lime boxes did. What causes this?

How is it possible to determine the value of a batch of new oxide?

231—Carbon Black.

Can you furnish me with the name of any firm which makes equipment for manufacturing carbon black from natural gas?

232—Corrosion.

Why does iron corrode so rapidly when laid in a bed of cinders?

220—By-Products.

In what way can we realize the most from our by-products?

The by-products which it would be possible to recover on a gas works such as the above may be enumerated as follows:

(1) Coke. (2) Coal-gas tar. (3) Ammoniacal liquor, from which would be sulphate of ammonia. (4) Sulphur, in the form of spent oxide, from which sulphuric acid might be manufactured. (5) Cyanogen, either in the form of ammonium sulphocyanide or prussiate of soda. (6) If tar distillation was carried on, the various products resulting from primary and secondary fractionation would be obtained, i. e., benzol, toluol, creosote, anthracene, pitch, etc. (7) From the water-gas plant there would result oil-gas tar and sulphur from the spent oxide. In addition breeze as distinct from coke might be mentioned; also, the treatment of rough breeze and pan coke would yield washed coke and washed and graded clinker suitable for filter beds, etc. The removal of CS_2 by means of lime would account for a practically valueless by-product, but one which may be partly restored to its original nature (CaO) by the employment of a lime-burner. In very rare instances, the removal of CS_2 by means of alkalinated cellulose is responsible for a further product, namely, viscose, which is of service in the manufacture of celluloid. As regards liquor, a product which is attracting some attention at the present time, and which may be produced in lieu of or together with sulphate of ammonia, is liquor ammonia.

As regards the best methods of realizing the utmost commercial value from by-products the first consideration, often unhappily overlooked, would be that of obtaining a first-class sales manager and paying him a first-class salary. Providing that there was no inefficiency in the works department, there should be no difficulty in realizing the maximum value from the products, having regard to current market prices.

The quality of coke will be enhanced by arranging for heavy charges of coal of long duration. A modest sprinkling of water might be arranged for by those having an eye for the small items which count. Generally, however, the moral obligations of the gas engineer prevent him from indulging in this. The quality of the tar will be affected by the duration and size of the charge, also the temperature of carbonization. Modern practice is to produce a tar with distinctly benzenoid characteristics. The quantity of sulphate of ammonia obtained will depend, primarily, on the temperature of carbonization, the yield of ammonia, according to the latest evidence, being at a maximum at a temperature of about 1,600° Fahr. The tendency in this country at the present time is to manufacture a sulphate of high-testing quality; that, is, to obtain the utmost commercial value in the face of competition the salt should be worked up to a 25 per cent. ammonia basis, with free acid and moisture as low as possible. A white or good grey color should be aimed at. Sulphur at the present time finds a ready market, and those works possessing plant for the manufacture of sulphuric acid are hand in hand with the spoilt children of fortune. They are extracting "the utmost commercial value therefrom." The yield of hydrocyanic acid is dependent again on temperature of distillation, or rather on the temperature to which the products are submitted. The higher this temperature the greater will be the yield. As regards recovery, the most economical and suitable method is the polysulphide

process, the low working expenses of which enable a small but appreciable revenue to be obtained from this minor product. The value of water-gas tar differs at the present time but little from that of the coal-gas variety. For the best results the carburetor and superheater should be worked at moderate temperature, whilst dehydration should be arranged for, if possible.

225—Solvent for Acetylene.

Has there ever been used commercially any other solvent for acetylene other than acetone?

J. H. James has been experimenting with a view to discover a suitable cheaper substitute for acetone as a solvent for acetylene. He found that 82 ounces of acetaldehyde absorbed 48 ounces of acetylene at 70° F. (21° C.) with the pressure gauge at 265 pounds as compared with 37 ounces of acetylene absorbed by 85 ounces of acetone at the same temperature, with the pressure gauge at 250 pounds. Tests of the candle-power of the gas evolved from the saturated solvent showed that whereas with acetone and another commercial acetylene solvent (a complex mixture of organic liquids) there was little more than 1 hour between the first warning (diminution of candle-power) and the extinction of the light, there was an interval of 4 to 6 hours in the case of acetaldehyde. The loss of solvent is greater with acetaldehyde than with acetone (about 8 ounces, as compared with 4 to 6 ounces for each discharge of the storage tank), but the aldehyde vapor is a good diluent for acetylene, having a relatively slight effect on the candle-power and calorific value. Acetaldehyde can be made directly from denatured alcohol, and hence is likely to become cheaper as improved methods of agriculture make it possible to produce denatured alcohol more cheaply.

REPEAT QUESTIONS.

226—Waterproofing Masonry.

What is the best practice to obtain waterproof concrete walls?

227—Electrolysis.

What is now the accepted practice to prevent electrolysis and what satisfaction is being obtained with the use of pipe coatings?

228—Blaugas.

What is Blaugas and how does it compare with other combustible gases?

THE MARKETS.

Government Takes All Cast Iron Pipe—Decrease in Unfilled Tonnage of Steel.

The central office of the cast iron pipe makers in New York reports contracts placed on a basis of $59 for the northern foundries and $50 for the southern plants, which is at least $5 under the open market. Practically no general business is being solicited at present, as the government's requirements for cantonments, etc., is absorbing the entire present supply.

Unfilled Tonnage of Steel Declines.

For the first time since October, 1916, the unfilled tonnage of the Steel Corporation has dropped below the 11,000-000-ton mark. A statement issued August 10 shows a decrease of 539,123 tons during July, bringing the order book on July 31 to 10,844,164 tons. Hesitancy of consumers because of uncertainty as to what the government may do is the reason given for the July decline. Chicago reports that the demand for steel sheets continues strong with quotations unchanged. On No. 28 gauge black, the minimum appears to be 9.19c, Chicago, and on No. 10 gauge blue annealed 8.94c, Chicago. No. 28 gauge galvanized is steady at 10.19c.

Pig Iron Production About the Same.

The yield of pig iron for the first half of 1917 compared with the corresponding period in 1916, shows as follows:

	1917.	1916.
Basic	8,620,604	8,830,085
Bessemer and low phos.	7,041,426	6,939,177
Foundry and ferro-silicon	2,602,448	3,086,410
Malleable	509,982	460,839
Forge	198,914	169,306
Speigeleisen and ferro-manganese	210,422	189,046
Other grades	74,429	44,659
Totals	19,258,235	19,619,522

Of the pig iron made the first six months of 1917, 13,573,446 tons were for the maker's own use and 5,684,789 tons for sale.

Government Gathering Data on Coke.

Saturday, August 11th, a telegram of 569 words was received by all leading Connellsville coke producers from the Federal Trade Commission, requesting extremely accurate detail costs of coke making and coking coal mining for the year 1916, and for June of this year. These figures were to be sent to Washington within three days, and in some cases the commission asked that preliminary figures be wired to hasten compilations. Connellsville blast furnace coke for spot shipment commands from $15 to $16, ovens, $2 higher than a week ago, or $5 to $6 above prices prevailing a fortnight ago. The car supply has been 75 to 80 per cent., compared with 55 to 60 per cent. the week before.

The entire supply of toluol after the filling of existing French contracts, probably will be diverted to the use of the United States government, the allies confining their demand to benzol and phenol for making picric acid, which is the base of the English lyddite and French melenite. The American government will use trinitrotoluol, which is considered superior to other forms of high explosives, as it is safer to handle and slower to explode, yet has tremendous shell shattering power. The production of toluol from March 1 to October 1, 1918, is rapidly becoming sold up, while supplies for delivery before March 1 are exceedingly limited. The sale of toluol to the government continues on the basis of $1.50 per gallon, at producers' plants. A few odd lots for outside buyers have been going at about $2 per gallon, the nominal price range being $1.75 to $2. Export demand for phenol is heavy, and the output of material for the remainder of 1917 is practically sold up, the price remaining unchanged at 40c to 45c at producers' plants. Demand for pure benzol is brisk, with prices unchanged at 55 to 60 cents per gallon for both spot and contract. The market for solvent naphtha is rather quiet, ranging from 18 to 25 cents for spot and from 18 to 22 cents for futures. Spot sulphate for ammonia is $4.85 to $5 per 100 pounds.

Germany May Be Compelled To Issue Gas Tickets.

The "Frankfurter Zeitung" says that in a few weeks gas consumption in Germany will be regulated and gas tickets issued. The country's gas works are in a serious economical position. Coal supply has overshadowed all else for some months past. Negotiations and conferences have so far effected no improvement, and the gravest fears are entertained for the autumn and winter.

New Holder at Bay City Nearly Ready.

The new tank being erected by the Bay City (Mich.) Gas Co. is rapidly nearing completion. It will probably go into use within a month. The tank has a capacity of half a million cubic feet. The company expects to give its consumers a more uniform service as a result of this addition to its plant.

Largest Contract on Coast Is Announced.

The Western States Gas & Electric Co. has closed the largest single gas contract on the Pacific coast, according to H. M. Byllesby & Co. Upwards of 4,000,000 feet of gas a month will be suppied to the Holt Manufacturing Co., at Stockton, Cal., for the purpose of testing tractor engines, displacing petroleum distillate formerly used. Monthly consumption of gas by the Holt factory may reach 10,000,000 feet, which would make it one of the largest consumers of gas supplied by a public utility company in the United States.

National Tube Sells Kewanee Fittings Plant to Walworth.

The National Tube Co., of Pittsburgh, announces the sale of its plant at Kewanee, Ill., to the Walworth Manufacturing Co., of Boston. The National Tube Co. retires from the fittings business.

Qualities of Silica Brick

Details of Manufacture Outlined—Causes of Failure and How Defects May Be Overcome Outlined in Paper Before Society for Testing Materials

In the by-product coke industry the development of the use of silica brick is interesting, declared C. E. Nesbitt and M. L. Bell in a paper at the recent meeting of the American Society for Testing Materials. Formerly a quartzite brick was used which was made of a mixture of clay and ganister. The object of the quartzite brick was to overcome the shrinkage and settling common to fire brick. Some 12 years ago silica brick were used experimentally in both beehive and by-product ovens. The experiment proved so successful that their use increased rapidly; not only did their expansion on heating produce close, well-fitting joints and overcome settling difficulties, but their better conductivity greatly reduced the coking time.

In the manufacture of silica brick in this country the raw material used is quartzite rock commonly known as ganister. The important deposits are found in Huntingdon and Blair counties of Pennsylvania, Devil's Lake region of Wisconsin and in Alabama and Colorado. It is essential for high-grade silica brick that the ganister be hard and dense. The rock should analyze about 98 per cent. silica, with 1 per cent. each of iron and alumina. The raw material is broken to convenient size, lumped into a wet pan and ground with water and lime. The degree of fineness and the amount of water is left to the judgment of the operator. This is a source of considerable variation, as the degree of fineness has considerable influence on the strength of the finished brick.

Lime Used for Binder.

The binder commonly used is lime. Two per cent. has been found to give the most satisfactory results. Percentages greater than this lower the refractoriness and decrease the strength of the brick, while percentages below 1½ per cent. do not give a satisfactory bond. Binders such as iron, alumina, talc, water glass and other substances have been tried with more or less success.

The amount of water necessary to produce a satisfactory working mud varies somewhat with the kind of rock used, amount of calcined material present and the method of manufacture. The percentage of moisture present is important. About 10 per cent. of available moisture is the proper amount for hand-made brick. Too wet a mud will produce bricks and shapes which distort after being taken from the mold, while too dry a mud is responsible for a number of very serious defects, such as unfilled corners, sponginess, improper slicking and lack of cohesion, all of which tend to give a finished product of low mechanical strength, very susceptible to spall, and slag penetration.

The molding is a very critical point in the manufacture of silica brick. Improper filling of the molds, too wet or too dry a mud, improper slicking dirty pallette boards, or careless handling, all contribute their share to the making of a defective product. The defects can largely be eliminated by close inspection and rejection of all but good bricks.

Drying the Brick.

Drying of the brick after molding is accomplished either on a hot floor, heated by steam, or in tunnels heated by hot air from the kilns. Drying on the floor is naturally the slower of the two methods, four to six days being required for 9-inch brick and proportionally longer for larger shapes, while drying in tunnels may be accomplished in 18 to 24 hours. It is important that drying shall be done carefully and thoroughly, for unless the material is bone dry when placed in the kilns, fire cracks are apt to result.

The dried brick are set in kilns, which are usually of the down-draft type ranging in capacity from 50,000 to 150,000 bricks. It is important in setting that the bricks shall be true to shape in order that they may have a proper bearing and stack well. Green bricks will not sustain a load of much more than 100 pounds per square inch, hence care should be taken not to overload them. Shapes should not be placed near fire boxes nor bear much weight. They are frequently boxed in.

Time for Burning.

Complete burning requires from 10 to 15 days, with a gradual increase in temperature until at least Segar cone number 16 with a melting point of 1,450 degrees is attained. The final temperature must be held a sufficient length of time to thoroughly and uniformly heat the entire kiln, which may require anywhere from one to three days, depending on the size of the kiln.

The cooling usually requires about five days and is accomplished by gradually opening the fire holes and doors until the bricks are cool, when they are removed and placed directly on cars or in the stock house.

Tests of Silica Brick.

In order that the degree of fineness of material and pressure might be studied an experimental series of silica brick was made with these two factors as the only variables. A good quality of Pennsylvania ganister was selected and ground dry in three lots to pass a 12, 8 and 4-mesh screen respectively. To the ground material was then added the water and lime, so as to give 9 per cent. of moisture and 2 per cent. of lime. From each of the above meshes standard 9-inch bricks were

Table I.

TESTS OF SILICA BRICK ARRANGED ACCORDING TO PRESSURES.

Pressure under which bricks were made, pounds per square inch	Apparent specific gravity	Impact, inches	Percentage spalled	Slag penetration square inches: Open-hearth slag	Slag penetration square inches: Heating furnace slag	Expansion linear inches per foot
187	1.50	47	45.5	3.48	2.28	0.155
500	1.58	46	48.3	3.68	2.42	0.155
750	1.59	60	53.2	3.63	2.41	0.158
1,000	1.63	65	51.4	3.79	2.42	0.160
1,250	1.65	68	47.9	3.65	2.50	0.155
1,500	1.66	65	43.6	3.82	2.50	0.160
2,000	1.67	67	44.8	3.64	2.45	0.159
2,500	1.68	71	42.0	3.72	2.50	0.160

made on a small hydraulic press at eight different pressures carrying from 187 to 2,500 pounds per square inch. The bricks were dried, burned and cooled following regular silica-brick practice, and were then subjected to certain physical tests to determine density, resistance to impact, resistance to spall, resistance to corrosive action of slag and expansion due to heating. A summary of the results is given in Table I, which indicates that little is gained by increasing the pressure. Table II shows the results of the various pressures averaged according to mesh, and illustrates the importance of its selection.

Table II.

TESTS OF SILICA BRICK ARRANGED ACCORDING TO MESH.

Mesh	Apparent specific gravity	Impact, inches	Percentage spalled	Slag penetration square inches: Open hearth slag	Slag penetration square inches: Heating furnace slag	Expansion linear inches per foot
4	1.66	57	30.4	3.92	2.63	0.156
8	1.62	63	47.6	3.67	2.39	0.159
12	1.58	64	63.2	3.44	2.29	0.159

Causes of Failure.

In actual service, although well guarded as far as practice and construction will permit, silica brick fail from three primary causes: spalling, crushing and slagging. These cannot be entirely eliminated, but by a deeper study of the manufacturing of brick they can be reduced to a minimum. An ideal brick must be well molded, true to shape, thoroughly bonded and of good mechanical strength.

A visual inspection of almost any shipment will show at least 20 per cent. of defective brick. Six shipments of brick of different brands brought out the fact that 60 per cent. of the defects were due to molding, 30 per cent. to fire cracks and 10 per cent. to improper setting and irregular shapes. These defects can be largely overcome in the present method of manufacture by careful inspection and rejection of the improperly made bricks at certain points in the manufacture.

The ganister must be carefully selected and sorted; all stock that is soft or which carries considerable iron, clay, sandstone or other foreign matter should be rejected. The ganister selected should be ground to just pass a 4-mesh screen, care being taken to avoid an excessive amount of finely ground material. To insure uniformity, frequent sieve tests of the mud should be made. To secure a sufficient bond, 1.75 to 2 per cent. of lime should be used. In order to avoid irregular shapes and molding defects, 9 to 11 per cent. of water should be used for hand-made bricks and the material should be pounded into the mold. The bricks should be thoroughly dried so as to avoid fire cracks when placed in the kiln. Great care should be used when heating, especially during the first part of the burn, to prevent fire cracking; this applies also to the cooling. The bricks, as they are removed from the kiln should be carefully inspected and all bricks showing molding defects, fire cracks and irregular shapes should be rejected. The consumer should be allowed to inspect the bricks before they are loaded on the car and a place provided for storage of such brick as he may desire to test.

IOWA IMPROVEMENTS.

Fairfield Benefits from Progressive Management — Many Changes Made.

Fairfield, Ia., was taken over in February last by the Iowa Electric Co., with headquarters at Cedar Rapids. This syndicate handles the Marshalltown, Perry, Iowa Falls and Fairfield gas plants, having at other places electricity only. R. S. Torrance is local manager, and Thos. D. Miller of Chicago is consulting engineer. Harry Firstbrook is carrying out reconstruction of the plant at present, and when through may take charge of the gas department, or may put a man on there and supervise all the syndicate's gas plants. At Fairfield everything is being torn out from A to Z. Among the new work is: One bench of six retorts, ½ depth; structural iron work in retort hose; front main from hydraulic to purifiers; engine house, exhausters, pumps, tar extractor and ammonia washer; rebuilding and remodelling condensers, scrubbers, purifiers and a house for them; meter room and laboratory, station meter, workshop and storeroom, toilet and bathroom; additional lift on a gasholder, dismantling small holder; converting pit into tar well; remodelling coal storage, adding additional space; overhauling distribution system, standardizing work, and laying new mains. Approximately 120 new consumers have been added in three months, and many more are assured as the service improves. Fairfield is a good town, averaging 200 new houses per year for the past seven years, with many more now building. The purchasing department of the Iowa Electric Co. is at Cedar Rapids.

The Cincinnati Gas & Electric Co. has sold $2,500,000 first and refunding (new) first mortgage 5 per cent. 40-year bonds to A. B. Leach & Co.

BETTER RAMIE.

New Method Found for Producing Stronger and Cheaper Material for Mantles.

"The Textile Mercury," of Manchester, England, in its issue of June 9, 1917, states that "a new method of preparing ramie has been proposed, namely, by retting based on bacterial action; and it is claimed, according to the Colonial Journal, that it has a great future. The International Institute of Agriculture states that retting takes 48 to 60 hours and is a perfect success, both on the stalks and the strips and the derived product called 'China grass.' The well-known difficulties, however, experienced in getting rid of the cork-like film will hardly allow of applying it except to China grass. Energetic washing is needed after retting. The resulting fiber, however, differs from the ramie fiber obtained by chemical retting. It differs greatly from silk waste, which the last named resembles; on the other hand, it very much resembles the superfine qualities of flax."

The product obtained is stronger, the fibers are more parallel, and it is easier to obtain long yarns with high yield. It is also possible to carry out bleaching, at least in medium sizes, on the finished yarn, and even to disregard this operation in inferior products and all those which do not need it, owing to their purpose. The cost of retting may be estimated at 40.5 cents per hundredweight of China grass in normal times, and the combing yield may go up to 44 cents. This method will render ramie growing possible in many districts when advances in machinery have furnished the means of producing China grass by mechanical means.

Doherty Builds Test Plant at Toledo.

A plan to increase the production of benzol and toluol has been announced by Henry L. Doherty. An expenditure of more than $100,000 will be made in equipping an experimental station in one of Mr. Doherty's plants at Toledo, Ohio.

"If I can get permission from the government to take the benzol and toluol out of illuminating gas I can produce, in the gas plants of the country, enough explosives to blow up the universe," said Mr. Doherty. "Artificial gas, now marketed for illuminating purposes, burns up most of the benzol and toluol. By removing it, the gas becomes almost non-illuminating from an open jet, but gives better light when used with a mantle. There is not one-tenth of 1 per cent. of gas used for illuminating purposes which now flows from open tips. It is pure wastefulness to do it. With benzol and toluol taken out of the gas it is better for manufacturing and commercial purposes, giving a higher temperature for pre-heating work.

"If I can get permission to take all of the benzol and toluol out of the gas manufactured all over the country it will give the government all of the explosives needed."

The Analysis of Light Oil

Method for Determining Benzene, Toluene and Solvent Naphtha Content Presented in Paper to American Gas Institute by Koppers Chemists

By F. W. Sperr, Jr., and A. A. Kohr

Chemists engaged with benzol recovery processes, have for some time been interested in devising methods for the estimation of the principal constituents of the various light oils derived from coal tar or coke oven gas. A number of such methods have been published during the past two years. Abstracts of some of the more important articles will be given at the end of this paper. The writers have tested some of these methods very carefully, and found them to give satisfactory results. They are useful in many cases, but each suffers the disadvantage of being applicable only when large samples (1 liter or more) of the light oil are available.

In many cases we are called upon to make analysis of much smaller quantities of material. Especially is this true, in connection with laboratory tests to determine the amount of light oil contained in gas from coke ovens or from other sources. The most accurate methods for making such determinations, actually produce only small quantities of light oil. Apparatus for the recovery of large amounts on a laboratory scale, is necessarily rather unwieldy, and the results obtained with the use of such apparatus, have to be carefully checked for losses in the exit gases. Our regular method for the determination of light oil in coke oven gas, which we expect to publish in a future paper, produces 20 to 50 cubic centimeters of light oil, in a single determination. The method discussed in this article was devised for the purpose of estimating the amounts of benzene, toluene and solvent naphtha, that such light oil could be expected to produce, the idea being to combine the light oil produced from two or three tests of coke oven gas for each determination. The method has been employed for some time and has given good results for the usual run of light oil samples, which generally contain at least 50 per cent. benzene, and not over 30 per cent. toluene. The accuracy of the method is much less for light oil, containing less benzene or more toluene, but such material is not so often encountered. If necessary the simple expedient can be adopted of adding sufficient pure benzene to bring the composition of the sample within the proper limits. Such check determinations as we have made on samples of known composition, show that with careful attention to details, the amounts of benzene, toluene, and solvent naphtha, can be determined, with an error in each case, amounting to about 1 per cent. of the total light oil, which is satisfactory enough for ordinary purposes.

Purification of Light Oil.

A sufficient quantity of the light oil is measured from a burette, and distilled to 200°C., using a flask fitted with a Hempel column, containing 5 or 6 inches of glass beads. In the testing of samples produced in connection with the determination of light oil in gases this preliminary distillation is made as part of such determination, and need not be repeated. It may be omitted in other cases at the discretion of the chemist. The distillate is caught in a suitable burette and measured. A quantity—preferably about 100 cubic centimeters and in any case not less than 50 cubic centimeters—is drawn off into a slender 300 cubic centimeter separatory funnel, and treated with 6 per cent. of its volume of concentrated sulphuric acid (specific gravity 1.84). This treatment is in two stages.

First, ⅔ of the sulphuric acid is added, then ⅓. After each addition of the acid, the mixture is shaken about five minutes, allowed to stand until separation is complete (about 15 minutes) and the sludge drawn off. The light oil is now washed with lukewarm water (about 40° C.) and this is carefully drawn off. Then five per cent. of its volume of sodium hydroxide solution (specific gravity 1.107) is added; the mixture shaken for five minutes; allowed to settle about 15 minutes or until clear and the alkali solution carefully drawn off. Finally the oil is washed with warm water (about 40° C.) and this is drawn off. Most of the water is removed by washing with 15 to 20 cubic centimeters of saturated calcium chloride solution. After this has been drawn off, a little solid $CaCl_2$ is added and the mixture allowed to stand over night. The light oil is then decanted back into the burette and measured. The difference in volumes gives an indication of the practical loss to be expected by sulphuric acid purification on a large scale. The specific gravity of the washed light oil is determined (at 15° C.) using a pyknometer or Westphal balance.

Method of Fractionation.

The distilling apparatus is shown in the accompanying print. The thermometer used is an ordinary thermometer graduated in single degrees, which has been checked against the boiling point of water. Correction for barometric pressure and exposed thread has not been found necessary owing to the relatively small amount of distilling in the intermediate stages. The diameter of the thermometer, however, should be less than half the diameter of the still head. The thermometer is so placed that the top of the bulb is level with the side neck of the distilling flask, and the top of the bead column must be at least ½ inch from the bottom of the bulb. Three 120-cubic centimeter glass stoppered Erlenmeyer flasks, numbers I, II, and III, are used for catching the distillates. Weigh the flasks empty and weigh the sample in flask II.

Transfer the weighed sample to the distilling flask; distil into flask II with a carefully regulated and protected flame, not faster than one drop per second. At the temperature of 130° C., stop the distillation and allow the condenser to drain well. Replace flask II with flask III, resume the distillation, stopping when the temperature of 200° C. is reached, then weigh the fraction in flask II (designate as fraction "A"), and the fraction in flask III (designate as fraction "B").

Place fraction "A," contained in flask II, in a similar distilling flask and distil to 95° C., catching the distillate in flask I, allow the condenser to drain, replace flask I with flask II, and distil to 120° C. Occasionally the flask will go dry before 120° C. is reached. In such event allow the flask to cool, so that vaporization will not take place when the stopper is removed, and add a small portion of fraction "B" (3 cubic centimeters has been found sufficient in all cases to drive over all the lighter oils), and then resume the distillation. All of this process of distillation must be performed slowly, especially when running off the portion between 95° and 120° C.; about one drop every two seconds is the correct rate.

Now weigh the fraction in flask I (designated as fraction "C") and the fraction in flask II (designated as fraction "D"). Put fraction "C" into a similar distilling flask and re-distil to 95° C., catching the distillate in the same flask, No. I. If difficulty is found in reaching this temperature, owing to the flask going dry, let the flask cool and add a small

portion (3 cubic centimeters is sufficient) of fraction "D". This final distillation must be made very slowly, starting with one drop in two seconds and finishing with one drop in four seconds. Finally weigh flask I. Designate its contents as fraction "E." The weighing flasks are not cleaned between distillations. The distilling flasks and condenser must, however, be clean and dry for each new fractionation.

Method of Calculation.

Call last fraction to 95° "E"
Call first fraction to 95° "C"
Call fraction 95 to 120° "D"
Call fraction to 130° "A"
Call fraction 130 to 200° "B"

"E" is equivalent to the weight of the true benzene content.

"D" + ("C" — "E") is equivalent to the weight of the true toluene content.

"B" + ("A" — "C" — "D") is equivalent to the weight of the true solvent naphtha content.

In order to figure percentages by volume, take the specific gravity at 15° C. of fraction "E" for the benzene, of fraction "D" for the toluene, and of fraction "B" for the solvent naphtha, and make the necessary calculations to percentages by volume of the original light oil. On account of the small size of the distillates, the determination of specific gravity will usually have to be made in each case with a carefully calibrated pyknometer. If possible use a 10-cubic centimeter pyknometer, fitted with a thermometer (or use the Drushel pyknometer, U. S. Bureau of Mines, Bulletin 125, p. 27. These materials have large coefficients of expansion, which necessitates careful and rapid weighing.

Correction for Paraffin Hydrocarbons.

In some cases such substances may be present, and are indicated by the low specific gravity of the fractions. The method for calculating the percentage of non-aromatic hydrocarbons is based on Dr. Rittman's suggestion. (*Met. and Chem. Eng.*, 1915, p. 682). The following figures are based for the specific gravity (some light oils contain carbon disulphide, the high specific gravity of which may completely mask the presence of any paraffins in the benzol fraction. In such cases the amount of carbon disulphide must be determined (V. Lunge, Coal Tar and Ammonia 5th Ed., p. 982) and a suitable correction applied) in question.

Sp. Gr. at 15 degrees C. on	Aromatics	Non-aromatics
Fraction "E"	0.885	0.720
Fraction "D"	0.872	0.730
Fraction "B"	0.869	0.760

The specific gravity of the fractions having been determined,

Let X = per cent. aromatics of any fraction of original light oil.
Y = per cent. non-aromatic of any fraction of original light oil.
G = Specific Gravity determined.
A = Specific Gravity aromatic fraction when pure.
N = Specific Gravity non-aromatic constituents.
P = per cent. of original light oil of fraction under consideration.

$$X = \frac{G - N}{A - N} \times P$$

$$Y = \frac{A - G}{A - N} \times P$$

It is evident that the foregoing method of estimation of benzene, toluene, and solvent naphtha is a purely arbitrary one, and it may be open to some criticism on this account, but a considerable amount of experience with it has shown it to give satisfactory results, both by comparison with other methods and by tests on artificial mixtures, containing known quantities of the materials in question.

Table I shows the results of estimations on samples made up with known quantities of benzene, toluene and solvent naphtha.

Test No. 6 is illustrative of several experiments that we have made which show that the method is not applicable to mixtures containing less than 50 per cent. of benzene. In cases of such mixtures, if a higher degree of accuracy is necessary, the fractions obtained from the preliminary distillation are mixed together and enough pure benzene is added to bring the composition of the sample within the proper limits.

In Table II we show the results of distilling samples at a too rapid rate. In test No. 1 the last fractionation was run at the rate of one drop per second, causing the separation of benzene to be inefficient. Test No. 2 was run rapidly throughout all the distillations.

Table III shows results of estimations made by this method compared with analyses of light oil samples made according to the method of Wilson and Roberts (*Jour. Gas Lighting*, May 2, 1916).

Test No. 5 shows results obtained from an oil containing too high a percentage of toluene for efficient fractionation by the method given. The benzene content should have been increased by the addition of a known quantity of C. P. benzene, but this was not done on this test.

It is interesting to note that a quick approximate estimation of the relative proportions of benzene, toluene and solvent naphtha in light oils of ordinary composition may be made directly from the results of the usual "boiling point tests." The results are of considerable value to the practical benzol plant operator. The method of making this test is well known to all benzol chemists and consists in distilling a 100-cubic centimeter sample in an ordinary Engler flask (See Gas Chemists' Handbook, 1916, p. 180). The distillate is caught in a 100-cubic centimeter graduate and the amounts distilling at 95° C., 100° C., 120° C., 180° C. are noted.

The benzene is taken as the average of the amounts distilling at 95° and 100° C. The toluene is taken as the amount distilled between 100° and 120° C. Solvent naphtha is taken as ⅔ of the amount distilling between 120° and 180° C. on unwashed materials, and as the amount distilled between 120° and 180° on washed materials.

In the case of light oils containing much over 60 per cent. benzene, the per cent. of toluene, as estimated by this method will be considerably too low. When samples contain much over 20 per cent. toluene the per cent. toluene as estimated by the method will be considered too high (See Table 5). We have found it to hold fairly good when light oils contain from 45 per cent. to 60 per cent. benzene, and from 10 per cent. to 20 per cent. toluene. Thus suppose we have a light oil sample which gives the following results by the "boiling point test."

Temperature Deg.	Total light oil distilling Per cent.
95	54
100	60
120	78
180	90

TABLE II.

	Actual composition of mixtures				Estimated by method		
Test	Sample taken	Benz.	Tol.	Solvent Nap.	Benz.	Tol.	Sol. Nap. and loss (by dif.)
1	99.40	65.0	20.0	15.0	65.49	18.92	15.68
2	95.83	70.0	15.0	15.0	73.92	13.13	12.95

TABLE I.

	Actual composition of mixtures				Estimated by method		
Test	Sample taken cc.	Benz. Per cent.	Tol. Per cent.	Solvent Nap. Per cent.	Benz. Per cent.	Tol. Per cent.	Sol. Nap. and loss (by dif.) Per cent.
1	99.40	50.0	25.0	25.0	49.85	25.12	25.03
2	88.06	67.5	17.5	15.0	66.58	17.63	15.79
3	57.42	70.0	20.0	10.0	69.37	19.55	11.08
4	98.98	75.0	15.0	10.0	74.43	14.71	10.86
5	96.86	80.0	10.0	10.0	80.04	9.25	10.71
6	63.25	45.0	40.0	15.0	41.0	43.69	15.31

Then the percentage of benzene is the average of 54 and 60 = 57 per cent.

The percentage of toluene is 78 — 60 = 18 per cent.

The percentage of solvent naphtha is 90 — 78= 12 per cent.

Dr. Rittman assumes that the aromatic as calculated in the 95° cut represents all of the benzene and in the 120° cut represents all of the toluene. Our experience has shown that this method is not applicable to small quantities of light oil recovered from coal gas; nor has it given satisfactory results on mixtures containing known quantities of pure benzene, and toluene with solvent naphtha.

TABLE III.

Estimated by method given				Estimated by method of Wilson and Roberts		
Per cent. Benzol	Per cent. Toluol	Per cent. Solvent	Test	Per cent. Benzol	Per cent. Toluol	Per cent. Solvent
48.0	20.2	11.0	1	48.9	19.8	12.7
40.0	15.6	—	2	41.4	15.5	6.2
59.1	16.1	11.2	3	60.0	15.3	9.0
44.1	15.9	8.5	4	45.8	15.2	6.2
33.0	30.2	11.7	5	36.0	28.0	11.4

TABLE IV.

Results of Tests of Known Mixtures Containing Correct Proportions of Benzene, Toluene and Solvent, for Estimation by Boiling Point Method.

Made up from pure materials					Estimated by "boiling points"		
No.	% Benz.	% Tol.	% Sol.	% Petroleum wash oil	% Benz.	% Tol.	% Sol.
1	60	10	10	20	57	9	8
2	55	20	15	10	52	17	14
3	50	20	15	15	46.5	17	13
4	45	15	15	25	44.5	14	14

TABLE V.

Results of Tests of Known Mixtures Containing Incorrect Proportions of Benzene, Toluene and Solvent for Estimation by Boiling Point Method.

Made up from pure materials					Estimated by "boiling points"		
No.	% Benz.	% Tol.	% Sol.	% Petroleum wash oil	% Benz.	% Tol.	% Sol.
1	70	15	10	5	71	9	8
2	30	50	20	—	9	66	17
3	20	60	20	—	0.5	83.5	16

It will be seen from Table IV that the percentage of light oil constituents as estimated by the boiling point test runs somewhat lower than the true values. However, on an unwashed coke oven light oil this test will give values that check the real composition somewhat more closely (cf. Table VI.). But even then about 1 per cent. should be added to the toluol as determined.

Other Analysis Methods.

Rittman (U. S. Bureau of Mines, Bul. 125); (*Met and Chem. Eng.*, 1915, p. 682) proposes a method for the estimation of benzene, toluene and xylene in cracked petroleum oils. The more important details are as follows: "Seven hundred grams of cracked oil are distilled from a 1-liter distilling flask through a fractionating column whose efficiency is at least as great as a 5-inch Hempel column of aluminum beads. Two successive redistillations are conducted, likewise, with efficient fractionation columns. For these a 200-gram portion of the 175° cut is taken. For the first redistillation fractions are separated at the temperature of 105°, 130° and 160° C. For the second, the cuts are made at 95°, 120° and 150° C." Specific gravities are then determined by whatever method seems convenient. "Measurements should be accurate to about one part in 1,000." The percentage of aromatic is then calculated from these values, from the following gravity relations in the various cuts.

Sp. Gr. at 15° C.	Aromatic	Non-Aromatic
95°	0.880	0.720
95°-120°	0.871	0.730
120°-150°	0.869	0.760

Several samples of about 100 cubic centimeters were made up by measuring various quantities of benzene, toluene and solvent naphtha from burettes. The preliminary distillation to 175° was of course omitted. For the first distillation fractions were separated at the temperature of 105°, 130°, and 160° and a second fractionation was then made taking cuts at 95°, 120° and 150°. As specified for these distillations a 200-cubic centimeter distilling flask exactly the same as the 3-inch flask shown by Dr. Rittman in his article "Analytical distillation of Petroleum (*Jour. Ind. Eng. Chem.*, 1915, p. 757, Fig. 3) was used; but the column was filled with glass instead of aluminum beads. In this same article Dr. Rittman observes that the use of glass beads makes little difference in the numerical results of analysis.

Table III shows the result of estimations of benzene, toluene and solvent naphtha in these samples. Although Dr. Rittman's method of distillation appears to give unsatisfactory results, his suggestion for the estimation of aromatic compounds on the basis of specific gravity is valuable, except that we use slightly different figures for the specific gravities of the benzene and toluene fractions.

Hugh W. James, A. R. C. Sc. (*Jour. Soc. Chem.* Ind., Vol. 35, p. 236, and *Jour. Gas Lighting*, Vol. 133, p. 531).—"The Determination of Toluene with a Note on the Application of the Method of Benzene and Xylene."

James distils 250 cubic centimeters of the oil to 140° C. through a six-bulb LeVel-Henninger column (other efficient ones may be used). The distillate is then distilled catching six fractions viz.: To 90° C.; 90° to 100° C.; 100° to 109°C.; 109° to 112° C.; 112° to 120° C.; and residue at 120° C. All of these fractions except the first and last are redistilled, using a column as before. All that distils below 110.6° is placed with the first fraction, and all above that with the last. This gives essentially a mixture of benzene and toluene in the first case, and of toluene and xylenes in the second. A boiling point determination of each of the two fractions is then made and the percentage of toluene estimated from tables given. Figures are given showing the percentage of toluene in artificial mixtures as compared with the percentage estimated by method. On the whole very good results were obtained, but this method would not be so applicable to quantities as small as, say 50 cubic centimeters.

Dyke Wilson and Ivan Roberts (*The Gas Record*, March, 1916, and *Jour. Gas Lighting*, May 2, 1916):

Benzene and Toluene in Light Oils.

Approximately two liters of oil are used by this method. The oil is first purified by washing with sulphuric acid, then soda and the product distilled with steam. This purified oil is placed in the still. The still is provided with a 40-inch Hempel column filled with glass balls for 36 inches. Attached to the top of the Hempel column is an efficiency vertical reflux condenser. By adjusting the temperature of the bath of the reflux, any degree of dephlegmation desired, may be attained. Benzene is taken as the amount distilling to 81° C. plus benzene in the intermediates. Toluene is taken as the amount distilling between 109° and 111.5° C. plus toluene in the intermediates. Percentages in the intermediates are estimated from boiling determinations in a side neck flask, and comparison with tables. Solvent naphtha is taken as the difference between the amount of washed oil charged and the benzene and toluene as determined, less any distilla-

TABLE VI.

Comparison with Fractionations, Actual Coke Oven Light Oils Used.

Fractioned by method of Wilson and Roberts				Estimated by "boiling points"		
No.	% Benzene	% Toluene	% Solvent	% Benzene	% Toluene	% Solvent
1	47.5	15.7	8.9	48	14	9
2	47.0	14.0	6.0	46	14	9
3	46.3	13.8	6.0	48	13	9
4	44.8	15.3	7.6	45.5	14	9
5	41.4	15.5	—	40.5	14	10

tion losses. Temperatures are measured by an accurate thermometer graduated in fifths of degrees inserted vertically in the top of the column above the reflux. The advantages of this method are that it gives large volumes of pure materials, only about 4 per cent. of the total washed oil being in the form of intermediates.

Gustav Egloff (*Met. and Chem. Eng.*, Vol. 16, No. 5, p. 259):

The Analysis of Light Oils.

Egloff uses a large sample (approximately two liters). This is placed in a copper still of about four liters capacity. The column is about eight feet in length, made up of six sections of three-quarter inch iron pipe, one foot each in length with a top section 18 inches in length. Sections are connected by means of sleeves. Between adjacent sections there is a 30-mesh iron gauze used as a diaphragm to support an 8-inch column of 2-inch glass rods of ⅛-inch diameter. Above each section of glass rods a ¼-inch iron pipe is screwed into the column which in turn is screwed into a ¼-inch main running down the outside of the column. This main at the lower end passes into the still, the lower end being just above the bottom, forming a seal, when the light oil is charged. This small pipe then acts as a reflux for each of the sections. A thermometer is placed in the top of the column.

TABLE VII.

		Actual composition of mixtures			Estimated by method		
Test	Sample	Benz. Per cent.	Tol. Per cent.	Sol. Nap. Per cent.	Benz. Per cent.	Tol. Per cent.	Sol. Nap. and loss (by dif.) Per cent.
1	84.4	75	15	10	78.0	7.8	14.2
2	96.8	70	15	15	73.7	8.2	18.1
3	100.3	60	25	15	64.5	22.5	13.0
4	97.6	50	25	25	54.0	19.5	26.5
5	99.0	65	20	15	68.3	15.1	16.6

Distillation is conducted at a rate of two drops per second. The amount distilling to 95°C. is taken as benzene, the amount from 95° to 125° C. as toluene, and the amount from 125° to 165° C. as the solvent naphtha present in the starting mixture. Various tables are given with a drawing of the still. The tables show the efficiency of the fractionation made and the accuracy which can be expected when using the method.

Egloff purifies the oil before fractionation by washing with sulphuric acid and soda, and then steaming with live steam to 180° C. This oil distillate is dried and placed in the still for fractionation. Paraffins are estimated from the gravity of the fractions obtained. At the end of the article Egloff gives some specifications for chemically pure benzene and toluene.

Purchasing Association Meets at Pittsburgh, Oct. 9-11.

The National Association of Purchasing Agents, 600 Westinghouse Bldg., Pittsburgh, will hold its annual congress in that city, October 9-11.

Handbook Data

Weights of Various Materials

Material	Weight per Cubic Foot
Ashes of soft coal, solidly packed	43
Brick, best pressed	150
Brick, common and hard	125
Cement, Portland	100
Cinders	40 to 45
Clay, dry, in lump, loose	63
Coal, anthracite, moderately shaken	56 to 60
Coal, bituminous, loose	47 to 52
Coke, loose, good quality	23 to 32
Concrete, wet	140 to 150
Earth, moist, packed	90 to 100
Glass	186
Gravel	120
Gypsum	141.6
Ice	57.4
Iron, grey foundry, cold	450
Lead, commercial	709.6
Limestone and marble	164.4
Limestone and marble, loose, in fragments	96
Lime, quick	95
Masonry debris	90
Mud, dry, close	80 to 110
Mud, wet fluid	104 to 120

Material	Wt. per Cu. Ft.
Paper	58
Peat, dry, unpressed	20 to 30
Pitch	75
Salt, coarse, Syracuse	45
Salt, solid	134
Sand, well shaken, dry	100
Sand, perfectly wet	130
Shales, loose quarried	92
Slag, furnace, granulated	53
Slate	175
Sulphur	125
Water	63
Zinc or spelter	437.5

California Commission Rules on Southern Counties Gas Co.

The Southern Counties Gas Co. of Los Angeles has been authorized to execute to the Central Trust Co., of Chicago, $400,000 ten-year 6 per cent. debentures. The gas company is to realize in cash from the sale of the debentures not less than 90 per cent. of their face value plus accrued interest. The proceeds from the sale of $227,000 of debentures shall be used to pay open accounts and notes payable. The proceeds from $26,000 of the debentures shall be used for working capital. The proceeds from $45,000 of debentures shall reimburse for moneys expended for capital purposes. The Southern Counties Gas Co., before issuing any of the debentures, shall transfer to reserve for accrued depreciation at least $50,000 of its earned surplus, and thereafter, unless otherwise ordered by the commission, apply annually not less than $50,000 of its earnings to depreciation.

GAS LITERATURE.

Fire Clay from a Manufacturer's Point of View.

By G. H. Timmis. "Gas Journal" 138, 392-3; (May 29).—The writer describes the mining of clays in the Stourbridge district and tells of some of the difficulties encountered by the clay producer in turning out a uniform and satisfactory clay. Clays of similar character in other respects differ greatly as regards their drying properties. This peculiarity does not seem to have been investigated. The greatest difficulty of the fire brick maker is testing the material under working conditions. Chemical analysis, rational analysis and cone tests are all useful but often fail in practice. In firing tests in laboratory furnaces, practical working conditions cannot be duplicated. One difficulty of the British maker of refractories is that nearly all settings for all purposes are made up from small bricks and consequently bricks must be made up for many purposes instead of for one particular purpose. The writer contrasts this with the American practice of having standardized forms for various uses.—D.

Coal Gas as a Substitute for Petrol on Commercial Motors.

By W. Clark Jackson. "Gas Journal" 138, 390-1; (May 29); also "Gas World" 66, 387; (May 19).—Tests of petrol motors using coal gas for fuel have shown from 84.4 to 87.9 per cent. as much power developed as when operating on petrol. It is probable that engines designed for higher compressions would compare even more closely with petrol. Commercial petrol has a heating value of about 19,000 B.t.u. per pound and specific gravity of .72; this is equivalent per gallon to 273 cubic feet of B.t.u. coal gas. On the basis of 84 per cent. engine efficiency one gallon petrol would compare with 325 cubic feet of gas. Gas for motor fuel has been successfully used for about nine months by a Beeston firm operating busses. The gas is carried in a flexible collapsible holder or gas bag on top of the bus. The busses weigh 3½ tons and at times carry over 70 passengers. The gas consumption under these conditions averages 350 cubic feet per 12 mile run which is considerably cheaper than petrol. The capacity of the gas bag is 400 cubic feet. It is a simple canvas sack covered with rubber insertion. With motor lorries where the gas bag storage is out of the question gas must be carried under pressure. For hauls of any considerable length the details of gas storage have not been satisfactorily worked out as yet and with small road touring cars the use of gas is quite out of the question.—D.

GAS LITERATURE AT A GLANCE

Conducted by R. S. McBride and C. E. Reinicker, Bureau of Standards, Washington, D. C.

Sampling and Analysis of Coal, Coke and By-Products.

An unusually valuable and complete publication "Methods for the Commercial Sampling and Analysis of Coal, Coke and By-Products" recently has been issued presenting the methods used by the United States Steel Corporation. The book represents the work of a committee of chemists selected because of their fitness for this work from among the constituent companies of that corporation. Some idea of the scope of this publication may be gained from the following chapter headings: Sampling, methods of analysis, methods for the determination of the calorific value of fuels, sampling and analysis of by-products, laboratory method for determining the relative yields of coke and by-products in bituminous coal by the progressive dry distillation process. The various methods presented are illustrated and described so clearly that this pamphlet will prove a valuable contribution chemical literature. Copies may be obtained for $1.50 each upon sending remittance to J. M. Camp, chairman chemists' committee, Carnegie Steel Co., Pittsburgh.

The Application of Coal Gas to Industry in War Time—Its National Importance.

By H. M. Thornton. "Gas Journal" 138, 144-148; (April 24).—In a paper read before the Royal Society of Arts, Mr. Thornton tells of the reasons for the popularity of the gas furnace including reduction of labor, readjustment of peace time industries to the manufacture of munitions and the great acceleration in production. The use of gas furnaces in munitions plants is described at some length and the use of gas in welfare work in factories is also dealt with. The conservation of fuel by the use of gas and the application of gas by-products to military and industrial uses is discussed.—D.

The Unification of Screw-Threads of Pipes, Etc., for Gas and Other Liquids.

By Societé Technique du Gaz. "Journal des Usines á Gaz" (March 20) via "Gas Journal" 138, 142-3; (April 24).—The recommendations of the committee relate to both cylindrical and conical threads and are embodied in tables which are presented with the text. An effort has been made to bring the metric threads into line with those of the Whitworth system, which is very extensively used throughout the world. In bringing about this agreement the inch has been taken as 25.4 mm. (an error of only 0.0000223 mm. and a base for standard threads has been chosen, of 5 inches (127 mm.) from which pitches of 140,90,70,55, and 40 threads per 127 mm. have been derived. On this basis the pitch is easily calculated in both metric and English units, while the threads so obtained are interchangeable to a degree more than sufficient in the pipe-making industry.—D.

Resinous Woods As Gas-Making Materials.

By Committee of French Professional Gas Syndicate. "Journal des Usines á Gaz" via "Gas Journal" 138, 18; (April 3).—The manufacture of gas from sea pine was tried in the gas works at Landes, France. The wood was in billets the size of a man's leg, cut from the middle of the trunk. The billets were made up into bundles (secured by iron wire) each of a size to fill a retort. The charge of wood was about half the weight of a charge of coal and carbonization lasted about half the usual time. When running one retort with wood to every two with coal no appreciable difference in the calorific power was noted. About 5 to 10 per cent. of small charcoal was obtained and this had to be carefully quenched. The tar from the combined distillation is much lighter than common tar and separates from water less readily. Trouble may be caused in the condensing system by the acidity of the tar unless enough coal, producing ammonia, is used to neutralize the acid. The gas yield was substantially equal to that from coal.—D.

The Utilization of Low-Grade Fuels.

By Prof. John W. Cobb. "Gas Journal" 138, 62-64; (April 10.)—The writer describes some apparatus and methods which have been employed in the utilization of low grade fuels such as ver-belt-pickings and washery dust. The small coal and coke as, for example, application of such fuels to steam raising and to the production of gas in producers is discussed and some attention is given to the briquetting of such fuels.—D.

Experiences With Gas of 400 B.t.u.

By James E. Enright of Tralee. "Gas Journal" 138, 185-6; (May 1).—During the past winter on two occasions when the town of Tralee was flooded and fires in the coal gas plant put out, a carburetted hydrogen gas of about 400 B.t.u. was supplied exclusively. No description of the gas-making apparatus is given but the indications are that some form of water gas apparatus was used, the fuel being a mixture of coal, coke, and tar. The tar was used to increase the hydrogen and methane percentages in the gas so as to keep down the percentage of carbon monoxide (which was kept below 18 per cent.). It was necessary to reduce the pressure on the town since the capacity was only about 60 per cent. of the demand. But few complaints were experienced and these from lighting customers on the extremities of the mains. In all but one case they were caused by insufficient pressure, the exception being a case where lamps having no gas or air adjustments were in use. Using this gas in various appliances it was found that with gas engines the B. H. P. was not affected by the B.t.u. of the gas, but the consumption was practically inversely proportional to the B.t.u. In gas fires and stoves this relation also held. With mantle lamps the gas was as efficient and economical as 500 B.t.u. gas (mixed water and coal). This he ascribed to the fact that the mantle burners are under control by opening or closing the key, also that they can be turned low without flashing back. The writer is convinced that this 400 B.t.u. gas is cheaper, better, and cleaner in every way and is suitable for any purpose for which coal gas is used. For cooking stoves he states that there is no necessity or advantage of using primary air for combustion, the air mixer could be discarded.—D.

Gas-Washing. Analysis of Products, Application to the Control of Stills.

By A. Edwards. "Gas Journal" 138, 187-190; (May 1).—The writer gives a full account of the technical work necessary to establish the particular works routine most favorable to good and economical recovery. The first point considered is the determination of the proper quantity of oil per ton of coal or per 10,000 cubic feet of gas. Some of the conditions affecting this are: (a) Quantity of benzol in the gas, (b) type of gas washer, (c) temperature of the oil, (d) cost and pressure of steam, (e) cost of water. The effects of these conditions are discussed at considerable length. Having settled the rate of oil circulation the writer states that efficient practical working may be maintained by: (f) metering and recording the amount of wash oil used, (g) indicating or recording the amount of hydrocarbon vapors extracted, (h) indicating the volume of steam used in the crude still, (i) periodic retort tests of crude benzol, (k) examination of the wash oil before and after the still for content of recoverable product, and (m) determination of viscosity of the wash oil. After describing these tests, the writer describes the analysis of the crude products and concludes with some remarks on the working of rectification stills.—D.

Oxidation of Coal.

By M. M. Georges Charpy and Marcel Godchot. A communication to Paris Academy of Sciences, via "Gas Journal" 138, 191; (May 1).—Fourteen samples of coal were heated for a considerable period at 100°C, while exposed to air. The coals were first dried by heating to 100°C for 3 hours. On further heating they were found to gain slowly in weight up to a maximum increase of from 3 to 5 per cent., which was reached in two and one-half hours to 3 months. At 100° to 150° C the rate of oxidation was somewhat more rapid. Above 150°C carbon dioxide was evolved with continuous loss of weight. On treatment with potash solution the oxidized coals yielded the brown coloration regarded as characteristic of

ulmic bodies. It was also found that the calorific power was considerably less. The loss as measured in a bomb calorimeter ranged from 3 to 13 per cent. From these observations the writers conclude that determinations of ash and of the volatile matter in a coal is liable to lead to erroneous conclusions as to its combustible value, since the process of oxidation may have progressed while the coal was in store.—D.

Distillation of Coal Under Reduced Pressure.

By Prof. Aimé Pictet, "Gas Journal" 138, 192-3; (May 1.)—Coal was distilled at a pressure of 15 mm. of mercury. Distillation began at 100° C and was completely finished at 450°C. that is, below the temperature at which distillation usually begins at ordinary pressures. The gas was not measured but its odor was greatly different from that of ordinary coal gas. The other products were water about 1.6 per cent. of the weight of the coal; tar, about 4 per cent., altogether different in appearance and properties from ordinary coal tar; and coke, more friable and more easily combustible than ordinary coke. The tar was a clear light brown liquid of greenish florescence, lighter at first than water. It was free from phenols. After treatment with soda and hydrochloric acid the tar still contains oxygen compounds with properties of alcohols. All the constituents of the tar of which the composition was determined belonged to the hydroaromatic series. When the crude tar was vaporized and passed over red hot coke, gas smelling like ordinary coal gas, ammonia liquor, and tar of the appearance of ordinary coal tar were produced. The latter contained benzene, toluene, xylene, phenols, naphthalene, etc. The assumption could therefore be made since these compounds were not present in the original tar obtained that they are formed in regular retort operation by the action of the hot coke and retort at high temperatures, on more complex and more hydrogenated compounds formed at lower temperatures. The hydrocarbons isolated from the low temperatures. The hydrocarbons isolated from the low temperature tar closely resembled hydrocarbons present in certain American petroleums.—D.

Coke Fuel for Motors.

By E. W. L. Nicol. "Gas World" 66, 385 (May 19); also "Gas Journal" 138, 332; May 22).—With a view to securing lower fuel costs many commercial motor users are adopting steam wagons of the ordinary locomotive type only to encounter difficulties in securing the relatively expensive Welsh coal for which they were constructed. Experience has shown, however, that the existing types of steam wagon can be successfully adapted to the use of suitably graded coke. A comparatively new type, the "National," has as a special feature, facilities for automatic coke firing. It is now proposed to adapt this type of chassis to omnibus service. Tests extending over a year in actual service have proven this type to be practical and decidedly economical. The Royal Automobile Club Technical Committee reports the coke consumption on a run of 219 miles with a load of 6,160 pounds to have been about 4 pounds per mile, a great saving over the use of imported oil or gasoline. It is estimated that the full normal service of 4,000 busses would be equal to the coke production of one of London's largest gas works.—D.

The Estimation of Washable Products in Gaseous Mixtures.

By N. P. Broadbridge, "Gas World" 66, 362; (May 12).—A study of the existing methods of determining the percentage of washable products in gases emphasizes the fact that the principal inconveniences arising from their employment are the viscosity of the solvent, the large amount of it required and lastly where creosote, green oil, etc., are employed the indefinite nature of the hydrocarbons already present. In addition tests on gases of low benzol content are made more or less inaccurate by the small size of the fractions obtained on distillation. The writer proposes a method designed to eliminate these difficulties. He uses a solvent such as ethyl alcohol which is miscible in water and dissolves benzol. When water is added the benzol is thrown out. Three wash bottles in a freezing mixture are used. The first two contain alcohol and the last water to catch any alcohol vaporized. The freezing mixture reduces vaporization to a minimum. The concentration of the alcohol must be 1 to 4. If too concentrated the benzol will not be thrown out, if too dilute the bulk of the solution will be inconveniently large and minute globules of benzol will remain in suspension. The method is particularly applicable to partially washed gases.—D.

Gas Holder Without Tanks.

By a Correspondent. "Gas World" 66, 403; (May 26).— A holder without a water tank has been built at Leerdam, Holland. This holder finds its origin in the necessity of making heavy foundations for all holders with overground tanks. In the case of this "dry" holder the most of the weight of the overground tank holders is done away with. The holder resembles a big tower scrubber. No guide frame is to be seen, and there is only a stiffening frame enclosing the sheet work. Seen from above is a big cylinder or rather a polyagonal shaped tank with a smooth interior surface wherein a dish is allowed to travel up and down. To hold the dish in balance are guides connected to it, which travel along the smooth interior surface, which is lubricated with fresh coal tar. The circumference of the dish is not horizontal but has been bent downwards. To this part are fastened pieces of wood forming a wooden ring between the dish and inner tank wall. This ring of wood is the bottom of a tar seal which is maintained by a constant flow of tar from a tank in the center of the dish. No heating of the holder is necessary in winter and the cost of pumping tar is relatively small. The tar is circulated from the bottom of the holder and none is wasted. A holder of this type has worked successfully at Posen, Germany, for two years.—D.

French Hygienic Tests of Gas Fires.

Anonymous. "Journal des Usines á Gaz" via "Gas Journal" 138, 286-7; (May 15).—Methods and apparatus whereby the degree of contamination of the atmosphere of a room by gas fires burning within it, may be accurately determined, are described. Standards of purity of air in the room are discussed. In the tests made by the Central Coke Committee and the Paris Gas Company the standard is adopted that in a testing room of 2,000 to 2,800 cubic feet volume, the increase in the proportion of carbon dioxide during the use of a stove for four hours should not exceed one part in 1,000. In respect to the presence of carbon monoxide, the standard is even more rigid. The four hour test should show complete absence of carbon monoxide in the room. The extreme limit sanctioned by the Central Coke Committee is one part of Carbon monoxide in 200,000. In conclusion the article emphasized the evil effects of the use of gas stoves without adequate flues, in tests conducted in a room representing average ventilation conditions it was found that the percentage of Carbon dioxide reached the hygienic limit set in 20 minutes, when the stove was used without a flue.—D.

Toluene Extraction.

By H. C. Applebee. "Gas Journal" 138, 338-9; (May 22).—In this paper the writer gives a general review of the process of toluol recovery. The qualifications of a good wash oil are discussed to considerable length. The writer also gives a table showing the effects upon candlepower of varying amounts of wash oil. The enrichment of gas with petroleum distillates is touched upon. The writer also describes the washing apparatus used for washing the gas, the method of operation and the subsequent distillation of the wash oil to recover the crude benzol. The methods of testing to determine the efficiency of scrubbing are described. Considerable data as to yields and operating conditions are presented.

Progress Being Made in the Coal Situation.

The production of coal in the United States last year, was the greatest in the history of the country. A new record, however, was set for the first six months of this year, fully 270,000,000 tons of bituminous coal being produced since January 1st, thus exceeding the output of the first six months of last year by about 20,000,000 tons. The limit has not yet been reached, for the railroads now are working out much better the problem of car supply and giving the mines greater facilities for transporting their product to market.

Valley Natural Gas Co. Establishes Prior Rights.

The Connersville Blower Co., Conplaint of the Valley Natural Gas Co., has ordered the Midway Gas Co. to discontinue the supplying of gas to customers in the Midway oil fields and particularly to E. L. Doheny and American Oil Fields Co.

Penn York Gas & Oil Co. Incorporated at Leroy, N. Y.

The Penn York Gas & Oil Co. recently was incorporated at Leroy, N. Y., to deal in natural gas, coal, oil, etc., with $1,000,000 capital. J. A. Beck, W. H. Lobaugh and S. L. Purdy are the incorporators.

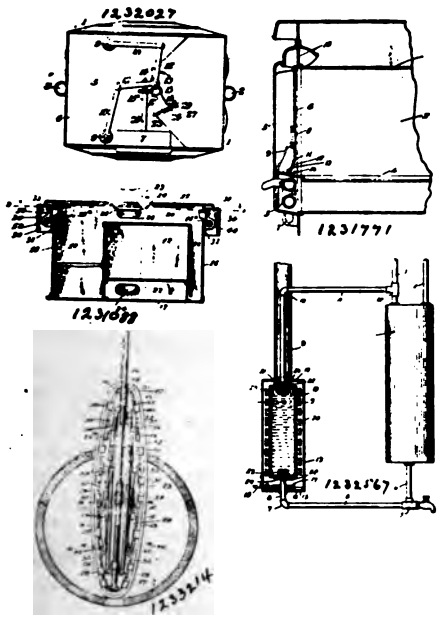
RECENT PATENTS

By R. S. McBride, U. S. Bureau of Standards

Patents Granted June 26, 1917.

1,230,915.* SELF-HEATING SOLDERING IRON. Napoleon Martel and Joseph Ervin Rascoe, Plattsburg, N. Y., assignors of one-third to Solomon S. Kempner, Plattsburg, N. Y. A gas-heated soldering iron with special form of burner chamber.

1,231,087.* COMBINATION COOKING RANGE. William F. Spieth, Cleveland,



Ohio. The combination is for gas and solid fuel to be used interchangeably.

1,231,391.* COMBINATION COAL AND GAS RANGE. Max R. Lehman, Quincy, Ill., assignor to Quincy Pattern Co., Quincy, Ill., a corporation of Illinois. The oven and top are heated by coal, but only the oven is heated by a large U-shaped burner below the oven space.

Patents Granted July 3, 1917

1,231,583. HEAT ATTACHMENT FOR GAS JETS. Guy W. Ferdon, Cresskill, N. J.

1,231,726.* GAS BURNER. Frank W. Gault, Jr., Okolona, Ky. The special shape of the injector tube is of interest.

1,231,771.* GAS OVEN. William L. Mersfelder, Kennedy Heights, Ohio. The door is formed with a flue chamber in it and a trough is provided around the base of the oven wall to catch condensed water which may run down the walls.

1,232,027.* JOHN GRIBBEL, Wyncote, and Charles Atherton, Philadelphia, Pa., with assignment by Atherton to Gribbel. The device prevents more than one and a fraction turns of the meter mechanism in the reverse direction but the stop does not operate as a check on the first revolution in this direction.

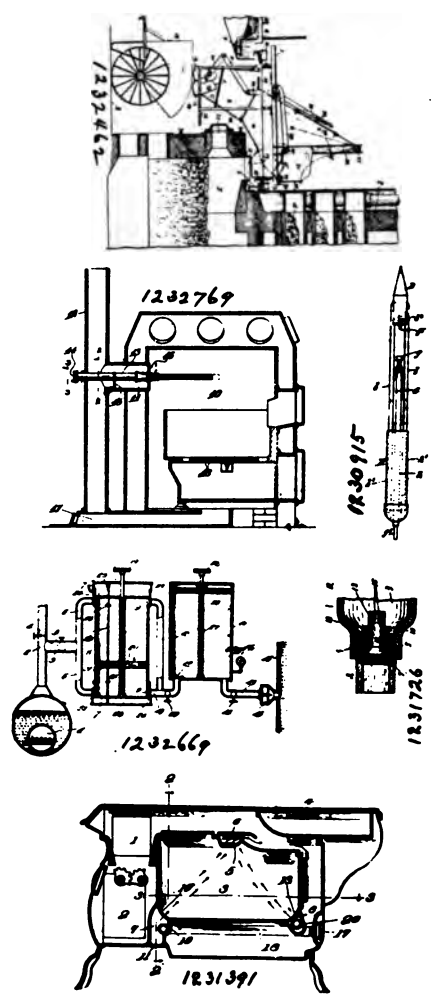
1,232,036. GAS LIGHTING AND EXTINGUISHING APPARATUS. George C. Innis, Boston, Mass., assignor to Phil C. Stingel, West Medford, Mass. The mechanism provides for the proper relative timing of the turning on of gas to the main and the pilot burners.

1,232,130.* THERMOSTATIC PRESSURE VALVE. Eugene B. Walsh, Brooklyn, N. Y., assignor by direct and mesne assignments to The Walsh Manufacturing & Heating Co., Inc., a corporation of New York. The valve is operated to control a radiator or other heater temperature by the pressure of the steam in the water chamber.

1,232,131.* RADIATOR HEATER. Eugene B. Walsh, Brooklyn, N. Y., assignor by direct and mesne assignments to The Walsh Manufacturing & Heating Co., Inc., a corporation of New York. A gas-steam radiator with pressure control of temperature. Of previous patent.

1,232,324.* GAS FIRE KINDLER. Theodore Kaufer, Brooklyn, N. Y. The gas burner is placed just below the grate for the solid fuel as shown.

1,232,435.* HEATER. Frederick D. Schneider, Cleveland, Ohio, assignor to The Long-Landreth-Schneider Co., New



Brunswick, N. J., a corporation. The patents for one of the form of water heaters manufactured by this corporation.

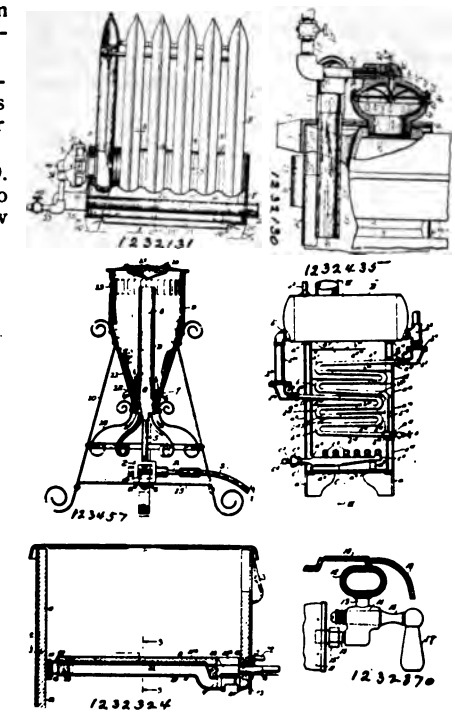
1,232,457.* GAS HEATER. Robert E. Campbell, Berkeley, Cal. The secondary burner tube provides a combustion space for the simple flame.

1,232,462.* MEANS FOR RECEIVING AND DISCHARGING COKE FROM GAS RETORTS. William H. Gartley, Philadelphia, and Stephen P. M. Tasker, Wynnewood, Pa., assignors to The United Gas Improvement Co., a corporation of Pennsylvania. The hopper receives the hot coke from the retorts and discharges it into either the furnace or the hot-coke buggies as may be desired.

Patents Granted July 10, 1917.

1,232,567.* WATER HEATER. Charles R. Keiter, Scammon, Kans. A circulating water heater special in respect to the character of the heating surfaces.

1,232,669.* SMOKE HANDLING APPARATUS. Alphonse Fernandez, Washington, D. C. A smoke or gas handling apparatus for use in connection with furnaces.



1,232,769.* DRAFT DEVICE FOR STOVES AND FURNACES. Patrick R. Carr, Chicago, Ill.

1,232,870.* GAS STOVE MANIFOLD. Arthur W. Walker, Malden, Mass. A guard extends from the edge of the top frame over the manifold as shown.

1,233,214.* EMERGENCY CLOSING MECHANISM FOR GAS MAINS. Thomas Frew, Chicago, Ill.

The Peoples Co. of Chicago strikes a new note in water heater advertising and again records "the world do move." The gilded aristocracy of sixty years ago could not enjoy, at any price, the luxuries of instantaneous hot water now available to the gas companies patrons. This advertisement brings out this point in a vivid manner. The display lines of the ad, cover an important and timely subject. The only object of criticism in this advertisement is in the light display of the two display lines near the center of the advertisement. These lines, while maintaining the unity of the advertisement as an example of artistic old time typography, leave the advertisement open to misinterpretation on first sight. At a glance, the hurrying newspaper reader might take it for a hotel advertisement.

Bill Complaints

This Manager Found a Way to Stop Some Groundless Kicking

How often do gas companies have complaints about excessive gas bills? I dare say fifty per cent. of the complaints are of this sort. The complainant usually says: "My gas bill is so much larger than last month or last year." At the complaint desk the usual method in adjustment is to show the consumer or to compare the bill complained of with the bill rendered for the same month of the previous year and as a rule the comparison satisfies the consumer. In a great number of instances the consumer has added some gas burning appliance during the year which they have not taken into consideration, or for various reasons their consumption should be more.

The writer had called to his attention recently, by a manager who had taken charge of a rather "run down" plant that a great number of his consumers were talking about their gas bills being double since the new management assumed charge. Their complaints were not made to the gas company, but it was general "'round about town talk." Among the talkers were the mayor, a prominent attorney and the editor of the most widely circulated paper of the town. The editor had even made mention of it in his paper.

The manager of the gas company, to stop this rumor, had statements issued and delivered to his consumers showing their consumption each month for a period of three years. In ninety per cent. of the cases the statements showed their bills were not more than in previous years and resulted in stopping the "'round about town talk" and much general satisfaction. It occurred to me that it would be worth any gas company's effort and expense to enclose such a statement with the consumer's bill once every year.

This statement could show such appliances as had been added during the year, if any, and the comparison would show the consumer to a certain extent, the cost of operating such appliances. Such a statement would assure the consumers that the gas company is looking after their interests and let them know the company's policies are other than the general public is inclined to believe and would also help eliminate the expense of maintaining the most expensive department of any gas company; namely, the complaint department.

A Retort "Write-up"

How a Colorado Reporter Described the Gas Company's Benches

Every gas man will sympathize with the reporter who recently got the assignment from the Colorado Springs "Gazette" to write a description of the new retorts in the gas plant of the Colorado Springs Light and Power Co. At the same time, the engineers in the industry might find a valuable lesson in this description. It shows just how the non-technical mind looks upon the product of the engineer's work. The bright reporter, after visiting the gas works, wrote this story about it:

"It's not easy work—manufacturing gas for use by city housewives. The good wife who gets up early in the morning and prepares hubby's breakfast over the gas range in the kitchen, has little idea of the hard work required to furnish the gas that lends its aroma to the toast and its taste to the coffee. In fact, she doesn't think about it—but the employe at the gas plant does. An eight-hour shift, consisting largely of stoking coal into the ravenous maws of 18 large furnaces or pulling coke from the depths of a brick firebox heated up to 2,500 degrees Farenheit, is very apt to place a different color on the proposition—and that is just what the employes do.

Long Process.

"It's an interesting place, too. The average consumer of gas doesn't realize how many steps must be gone through in order to produce gas from ordinary lignite coal, over which father groans and shakes his head during the winter "cold spell."

There are a great many stages in the game of gas production and every one of them, in order to be successful must be accompanied by considerable hard work and a few rounds of perspiration, not to mention the good strong English that is bound to accompany a burned finger or a pair of cracked shins caused by blocks of coal that refuse to stay in their place. The officials of the Colorado Light, Heat and Power Company have recently installed a number of new gas retorts at their plant that are supposed to be the real thing in gas manufacture. They aren't much to look at, consisting largely of brick walls and exhaling considerable of the breath of hades heated to 25 times normal; but in the production of gas, they are A1 regulars.

Heated to 2,500 Degrees.

"The coal is thrown into these retorts, already heated to about 2,500 degrees, and is allowed to burn evenly and slowly until all the gas is removed and is drawn off through the top to the purifying retainers, where it is passed over a residue of corn cobs and iron fillings in order to remove the sulphur and other impurities before it is allowed to pass into the storage tanks. By the heating process the gas is driven from the coal and the coal is slowly changed into a carbonate formation which, in turn, makes coke. And here comes the fun. The man in charge must then arm himself with an iron poker and pull from the oven this heated coke. (The man in the above picture, armed with the protuberant iron shillalah has just completed this part of the work and has stopped to wipe the perspiration and fire up with 'the leaf that cheers' before proceeding to the next furnace.) This coke is then allowed to cool, carted out to the sheds and later disposed of.

Coal Tar.

"There is still another by-product of the gas-making process. Coal tar, rich, black and sticky, is produced in great quantities, when the coal in the furnace really gets warmed to its work. This coal tar is used extensively in the production of dyes and was one of our great exports to Germany in the good old days before the kaiser and Uncle Sam adopted the recent 'strafe' attitude. In this day and age, however, the coal tar must descend the various notches of the social ladder and see service as a part of asphalt pavement or a rainproof roof for pig pens. Yes, it's an interesting process, but hard to describe when you don't know the difference between carbon-bisulphide and iodine."

NEW PRODUCTS

Humphrey Drive

Water Heater Salesman Tells Plan to Capture Automatic Prospects

By Robert Thompson

The success of the spring water heater campaigns has given new business men enough of a taste of big business to create a ravenous appetite. We all figure that a fall water heater campaign, founded on the spring drives, will exceed the results of the spring drives, during which most gas companies averaged "a year's business in a week." The new business force is looking for new worlds to conquer. The prospects that have developed during the past few months or those who escaped in the spring will get the advertising, teasing or shoving that is necessary to bring them face to face with the gas company's star water heater men.

The Humphrey Co. is planning with gas men for a big week, Sept. 8-15. This event will be heralded in quarter pages in the Saturday Evening Post of Sept. 1 and 8 and by 2 pages in the Sept. 1 issue of the Literary Digest and a page in the issue following. The two page spread of the Digest is a departure from the ordinary run of water heater magazine advertising and contains a strong appeal for architects and builders. This, of course, is inserted with a view to helping gas companies in their local campaigns on builders and architects. The magazine copy gets right down to brass tacks and gives a price of 1 cent for 10 gallons of hot water. This figure most talk to the purse as well as an appeal to the desires of the prospects.

The newspaper advertising for this campaign fits the gas man's experience and ideas of result-getting advertising better than any appliance campaign that has been put on the map. Henri, Hurst & McDonald, the advertising agents who figured in our spring success prepared this campaign after getting gas men's ideas and injecting some proved merchandising ideas of their own which had put across other advertising winners.

The entire newspaper campaign is presented to the gas company in proof form, so that it may be sent to the newspaper with instructions that can't be misunderstood. The script heading of the ads and the bold, commanding appearance of the layouts will make the gas company water heater campaign the outstanding feature of any newspaper's advertising. As in previous campaigns, the Humphrey sales force will work vigorously with the gas companies during the campaign weeks.

The Literary Digest two pages have been enlarged for a window display, so that all who run may read. The Humphrey Co. is offering inducements that will make it worth while for the gas company window trimmer to put forth his best in a water heater display.

One of the most welcome features of the spring Humphrey campaign was the clever ideas contributed by the new business managers of the companies making the drives. Many bright and winning new ideas came to light, showing that the stimulation of an extra large sales event is the one best bet in bringing out the best that is in a new business staff.

It is our intention to rush proofs of all this material to gas men, so that they won't have to worry about the advertising during the campaign, but may concentrate their attention on getting the names on the dotted lines. In case any interested gas man wishes a

Two Page Ad In Humphrey Newspaper Series.

Humphrey Two Page Ad for Literary Digest.

set of this material, all he has to do is to write to Kalamazoo and it will be sent him gladly.

The coupon in the newspaper advertising is a new feature in water heater publicity, and we expect that it will get many people to declare themselves "right off the bat," as well as reinforce the statements as to the limited amount of heaters available.

There are four special offer suggestions made for use with the newspaper advertising, if the new business manager elects. These offers are: "30 days' free trial—a year to pay"; "3 months' gas bills FREE"; "10 per cent. discount on all sizes," and "$5 off regular prices."

CLOW'S LITERATURE.

Co-operative, Intelligent Service Speaks From '17-'18 Broadside Now Ready.

Evidence that gas appliance companies are putting themselves in the front rank of manufacturers who have

Clow Cover Design.

caught the modern spirit of co-operative, intelligent service, is found in the 1917-1918 literature of James B. Clow and Sons, Chicago, makers of the Gasteam radiator. This material, just off the press, includes a broadside which offers to the gas man every sort of material wherewith to effectually visualize to his customers the advantage of heating with gas.

A human interest note is injected into the catalogue of Gasteam installations, illustrated in this broadside. On the front cover, a black-haired lass, of perhaps, seven summers, has forsaken her dolls and her toys, for the moment, in her Gasteam heated nursery, and is phoning to "daddy," and "daddy" answers back from the back page of the catalog. Beside "daddy's" desk is a Gasteam of larger size, greater calibre. Over his shoulder, through a window, we see the interior of his Gasteam heated factory, with a workman serenely busy at his lathe.

This same cover scheme is employed in a "little scout" circular, which we understand will be furnished in liberal quantities for envelope enclosures, office distribution, and for house-to-house use of salesmen.

A newspaper advertising service which is claimed to be quite the most complete ever offered in the gas heating line, is illustrated on one whole side of the "broadside" and aims to cover all of the various situations where Gasteam heating should be particularly attractive to customers, and equally remunerative to the gas company.

One of the principal values presented to gas men by way of assistance in landing gas heating business, is the Clow "handbook," which gathers up the selling points which have been proven by experience to be responsible for biggest sales. In the same book is found data relative to radiation required for various classes and sizes of buildings, piping, construction, operation, sales arguments, etc. This book is valuable for every gas company's new business manager, every floor salesman, every representative. No doubt the Clow people will send you copies if you write.

Of course no advertising service that intelligently approaches gas company merchandising is regarded as complete without a strong gas bill sticker series. Having learned that that medium of advertising is far and away the most valuable means of advertising at the disposal of any public utility, the live new business man, or company manager, welcomes just the touch that has been imparted to the Clow sticker service. Suffice it to say that a fond mother and her two little boys, compose the theme around which Gasteam comfort is built.

And there are movie slides, of course, slides which get right at the heart of this heating problem, and put it up to the millions who compose the movie audiences throughout the country.

Perhaps the most advanced movie registered in this Clow "broadside" is a window trimming service. Four simple, but powerful window trims are illustrated, with full directions for dressing windows to accomplish the effects shown. The strength of this service lies in the fact that the appointments are easily secured in any town.

The Gasteam catalog whose cover design was mentioned above, besides

Another Clow Page.

giving the salient selling points in favor of heating with gas, depicts installations in widely varying conditions, in home, factory, store, dance hall, restaurant, amusement pavilion, car barns, church, city hall, government building, office. It is intended for live prospects. It is printed in two colors. Men who are used to appraising printing values will agree that it should compete successfully for the prospects' attention with the highest grade of printed matter now used for an aid to selling.

Attractive and Suggestive Clow Illustrations, Used in the New Broadside of Literature Now Available.

NEW KEMP SYSTEM.

Detroit Plant Obtains Fine Results from Novel Installation.

An installation just recently made of a Kemp automatic gas system in the plant of the Long Mfg. Co., Detroit, and the equipment placed in the japanning oven of this well known concern is sufficiently novel and interesting to warrant a description and a study of it by the industry. It is explained that the air and gas mixture produced by the Kemp system is self sustaining or contains sufficient atmospheric oxygen for its complete combustion. The combustion products produce a neutral atmosphere or contain no carbon monoxide.

The radiators shown in the illustrations were taken at the Long Co. plant and are combustion products circulating radiators. Each is made of a cluster of three five-inch and five three-inch pipes as shown, terminating in rectangular boxes or headers at each end. In one end of each five-inch tube there is a two-inch blast burner supplied by the self sustaining mixture. The gas is forced through this burner under a pound pressure and produces a flame about eight inches in length. The combustion products soon expel the air in these radiators. By the force of the flame blast and the expansion caused by combustion, the products are forced to travel in one direction through the five-inch tubes, returning through the three-inch tubes and circulating very rapidly so that the radiators are heated uniformly throughout their length. The excess combustion products, caused by the continued combustion of the fuel exhaust from the rectangular headers into the false sheet metal wall or flue, find exit from the top of the flue through the cylindrical pipe passing through the roof of the oven. There are horizontal partitions in the false walls or flues which make 52½ feet of flue travel having an area or 1"x8".

Kemp Combustion Product Radiators in Long Mfg. Co. Plant.

Kemp Automatic Gas System in Japanning Ovens at Detroit.

It is found by tests that the oven when loaded with automobile parts is heated to a temperature of 425° F. in one hour. The enamel is uniformly and thoroughly baked on work taken from all parts of the oven. The temperature of the exhausting gases as they pass through the roof of the oven is found to be 18° lower than the temperature of the inside of the oven. This shows remarable efficiency.

This factory has been in operation day and night since the machine was installed. They have been unable to get a separate gas reading on the oven, but the gas consumption is evidently very much less than by the former method of heating, by which gas was burned in a sheet metal box and the products escaped into the false walls or partitions and with which method the escaping flue gases were at a very much higher temperature than the center of the oven.

The diagram herewith is of a smaller combustion product radiator than those shown in the photograph, but better shows the principle employed. In this smaller radiator, the combustion products which are in rapid circulation fill a tube 8 inches in diameter while the exhaust port "B" is 2 inches in diameter and is ample to take care of all the excess or exhausting combustion products. The flame blasted from the end of the

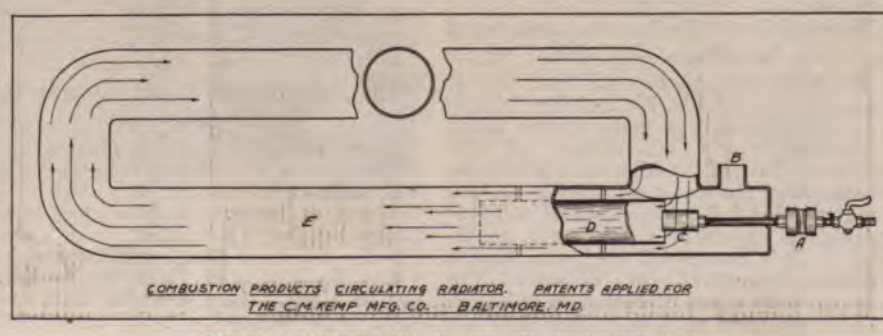


Diagram of Kemp Combustion Product Radiator.

burner "C" into the tube "D" creates a suction which entrains the combustion products into the burner end of the tube "D". A secondary suction occurs between the left hand end of the tube "D" and the wall of the radiator. The gases travel with considerable velocity and as the air and gas mixture requires no outside supporter of combustion, the flame burns as well in this enclosed chamber as it would in the open.

This system is especially suited to the use of thermostatic temperature controls, as there are no bunsens or air mixers and but one fluid to control. Method and apparatus patents have been applied for on this radiator.

Wilputte Corporation Takes Over Otto Coking Co.

Announcement is made that the Wilputte Coke Oven Corp. has taken over the organization formerly operated by the Otto Coking Co., Inc., and will build the Wilputte regenerative by-product coke oven. The new company is financed entirely by American capital. Louis Wilputte, the well-known coke oven engineer is president and general manager, and the engineering and purchasing departments have been taken over in toto.

A contract for eighty Wilputte ovens has just been awarded to the Wilputte corporation by the Steel Company of Canada, at Hamilton, Ont., and the new plant will be complete with by-product plant and coal and coke handling apparatus. Work has been started and the plant will be completed by December, 1918.

The Wilputte regenerative by-product coke oven, it is stated, represents the latest development in the coke oven art, and the new type has been installed or is under construction at the following plants: Mitsubishi Goshi Kaisha, Kenjiho, Japan, 50 ovens; Coal Products Manufacturing Co., Joliet, Ill., 18 ovens; Tata Iron & Steel Co., Sakchi, India, 200 ovens; Woodward Iron Co., Woodward, Alabama, 60 ovens.

The Wilputte company also will build benzol apparatus, and plants of its construction now are in operation at Lackawanna Steel Co., Lackawanna, N. Y.; Republic Iron & Steel Co., Youngstown, Ohio; Citizens' Gas Co., Indianapolis, Ind., and the Laclede Gas Light Co., St. Louis.

Hale Mixer Will Exhibit at California Convention.

The International Hale Gas Mixer Co. will have an extensive exhibit at the forthcoming convention of the Pacific Coast Gas Association at Santa Cruz, Calif, September 17-24.

Pressed Iron Radiator Announced by Hugo Mfg. Co.

A step toward the solution of the proposition of the high prices of gas appliances has been taken by the Hugo Manufacturing Co., maker of the Hawks line of ventilating gas radiators. The company is putting on the market this fall a new type of radiator designed especially for present conditions. It is stamped from heavy Armco iron and furnished ready enameled. The costs of all types of cast iron radiation have advanced so largely that they are beyond the reach of many who desire to use a good solid, permanent gas heating installation but cannot afford cast iron radiators. These people make just as good consumers of gas as any, however. The new appliance will undoubtedly help greatly to boost the gas heating consumption among people of moderate means.

The radiators are made of the well known Armco rust-resisting iron, very heavy (22 gauge). Sections are securely bolted together with three through tie rods. Additional bolts between each pair of sections also hold a baffle plate in place over the burner. Since the radiators contain neither water or steam and do not operate under any pressure there is no danger from leaky seams. They operate on the same ventilating principle as the older Hawks types—circulation by natural draft. Foul air from the floor is drawn into the burner, heated and rises inside the radiator to the top where it is drawn down again to the outlet, which may be 2-in. iron pipe or 3-in. stove pipe connected to a pipe flue or chimney. The manufacturer has tried not to sacrifice quality in getting out a lower priced article, but is using the best materials that can be obtained both in iron and in finishes.

"Thor" Makers Announce New Laundry Devices.

The despairing housewife need no longer believe that "cleanliness is next to impossible." The Hurley Machine Co. has a new Thor washing machine with a gas burner attachment that turns out snow white clothes at a minimum of expense and labor. The gas burner attachment keeps the water at any desired temperature and makes it unnecessary to carry kettles of scalding water to the machine. The burner also may be attached to any Thor machine now in use.

This gas burner has had gas company approval, and is proving all O. K. in service.

The Hurley organization has a gas and electric ironing machine of an improved model that offers another inducement for a woman to have a modern laundry. This machine may be very easily cleaned and will iron any kind of laundry work without possibility of injury, according to the proofs of its makers.

Gas companies planning to install domestic laundry departments may have the benefit of a successful experience in this line by getting in touch with the Hurley Machine Co., 29 S. Clinton Street, Chicago.

New By-Product Coke Ovens for Mark Mfg. Co.

Construction of a battery of 120 Semet-Solvay by-product coke ovens at the plant of the Mark Mfg. Co. now building at Indiana Harbor, has been begun by the By-Product Coke Corp. The By-Products Corp. will operate the ovens, the output of which will be used by the Mark Mfg. Co. in its blast furnace, now being built in connection with its steel plant.

Cabco Gas Radiators on the Market.

The Chas. A. Baxter Co., Pittsburgh, is pushing the Cabco Gas Steam and Hot Air radiators to gas companies with good promise of success, according to present reports. The steam gas appliance is automatic in its operation and will care for itstlf when kept filled with water, a thermostatic valve regulating the temperature. The average size Cabco gas steam radiator burns about 10 feet of gas as hour. The hot air radiator is of cast iron. It sells for less than the steam type. The makers state that "the volume of heat per square inch of radiation surface is about double that of any steam radiator." Full details may be had from the manufacturer.

A Youngstown mill has received an order for 10,000 tons of 4 to 6-inch pipe, to be ready for shipment the latter part of the week. Inquiries are pending for 12 miles of 8-inch, 12 miles of 12-inch and about 25 miles of miscellaneous sizes, involving about 5,000 tons in the aggregate.

The Zander Refrigeration Co. is now in its new plant and working at top speed to catch up with the many gas company orders for the Zander Gas Refrigeration Machine. Interest in this device is keen among gas men, many of whom have examined it and have become enthusiastic about its new business possibilities.

The Standard Fuel Appliance Co. of Detroit is figuring prominently in the industrial gas boom the industry now is experiencing. The Standard organization has made some excellent records on delivery of equipment and is represented by its appliances in many munitions factories.

Apparatus for Indicating Depth of Liquids in Tanks.

From "Iron and Coal Trades Review," May 18, via "Gas Journal" 138, 389: (May 29).—A trustworthy device for indicating depth of liquids in tanks, etc., is especially desirable now when by-product plants and chemical works using many tanks are being pushed to the limit of their capacity. Such a device must be not only reliable but safe when applied to tanks containing dangerous or inflammable liquids. The apparatus described is claimed to possess these qualifications. It is operated electrically by a low voltage alternating current. The principles employed dispense with moving contracts and avoid sparking and oxidation troubles. The apparatus consists essentially of a solenoid with an iron core actuated by a float and an ammeter graduated to read in feet and inches is connected in series circuit on the supply. The current flowing through the circuit varies with the length of core inserted at any time in the solenoid. Where a recording ammeter is used a voltage regulator is employed. A suitable dampening device prevents the recording of temporary fluctuations. One indicating or recording instrument may be used with several tanks widely distributed. —D.

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Baltimore Holder Foundation

46,000 Tons Supported at Base of 6,000,000 Cu. Ft. Holder at Spring Gardens Station—Details of Boring and Bearing Tests for Foundation

By George Beadenkopf,
Chief Engineer, Baltimore Consolidated Gas, Electric Light & Power Co.

Editor's Note—Pertinent construction details of foundations for large gas holders are set forth in the following article. The Baltimore Consolidated Gas, Electric Light & Power Co. several years ago erected at its Spring Gardens plant a 6,000,000 cu. ft. five-lift holder contained in a steel tank. The deepest part of the foundation is about ten feet below the surface of the ground. Some idea of the load which must be supported by the foundation may be gained from the following figures: The steel tank is 219 ft. in diameter by 37 ft. 6 ins. high, and has a capacity of 10½ millions gallons of water, the water weighing 86,410,000 lbs. The outer section of the holder is 215 ft. 11 ins. in diameter, the inner section is 204 ft. 3 ins. in diameter, and the total height to the crown of the holder when fully inflated in 222 ft. 6 ins.; total weight of steel about 5,500,000 lbs.

A properly constructed foundation for a large gas holder is as imperative as the proper design and construction of the holder itself. The most suitable site for the holder, considered from all standpoints, having been selected, the first step in the construction of the foundation is to make an investigation of the sub-soil.

Showing Method of Placing Concrete in Layers to Form Foundation Slab.

In the case of the holder under consideration, 16 four-inch test wells were bored at different points on the site; each test well was sunk 25 feet, except in the case of one well which was sunk 32 feet. These test holes were wash borings, and the character of the soil encountered in the various holes was saved and placed in glass jars about 1½ inches in diameter (see accompanying photograph) so that at a glance an exact cross section of the soil under the holder site could be seen. These jars with their contests were properly labeled and preserved as a matter of record.

Bearing Tests.

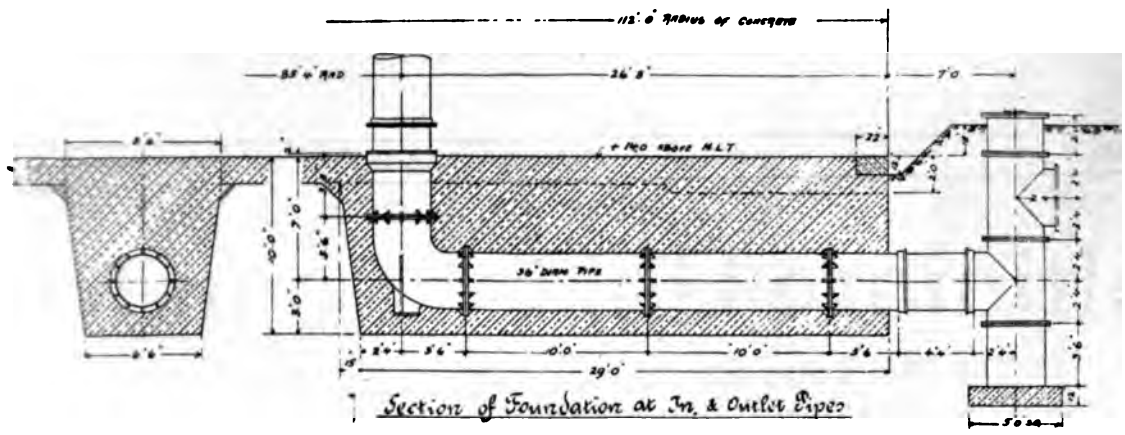
In addition to boring these holes, bearing tests of the soil were made at five different points on the periphery and at one point within the circle. These bearing tests consisted of placing a weight of 6,000 pounds on a square foot of timber, rigged up as shown by the accompanying photograph. The settlement of the soil under this test was carefully noted daily.

It was necessary to provide for draining the holder site during the progress of the excavation, and for this purpose a ten-inch drain pipe was laid to reach half way around the tank. This drain was later used as a permanent drain

to the tank overflow and for surface water.

The test loads placed on the soil where the rim of the holder tank rests were about one ton per square foot in excess of the actual heaviest ultimate load at that point. The test borings and bearing tests having been completed, the conditions were found satisfactory and showed that neither piling nor reinforcing the concrete base or slab would be necessary. The soil for a distance of several feet below the bottom consisted of a firm clay, underlying which was principally a sandy gravelly formation. The site of the holder is about 850 feet back from the river. The excavation was started in extremely cold weather, making it necessary to blast the frozen earth. All soft spots encountered were removed which made it necessary in some cases to excavate as much as five feet below the normal bottom and at some points ten feet below the original surface of the ground.

A simple way of testing the soil after the excavation was finished at any particular spot, and just before placing the concrete, was to take a one-inch round bar, having a blunt flat end and see how far it could be driven into the soil with one man hanging on it with his full weight. If the bar was found to penetrate the earth readily, it was an indication that the soil was soft, and such soft soil was removed; when it was hard to penetrate the soil with the bar, it was considered firm enough to place the concrete on it. This simple bar test was estimated to



Bearing Test of 6000 lbs. per sq. ft.

Tank Bottom Assembled 30-in. Above Foundation Ready for Riveting.

be equivalent to a test much more severe than was required for the foundation.

In placing the concrete on the rim, it was placed in two layers of about one foot each, and the concrete on the intermediate portion of the foundation was constructed by placing one foot of concrete and finishing it with a six-inch layer, smoothed on top.

Regular Size Slabs Not Used.

No attempt was made to put in regular size slabs nor was any allowance made for expansion and contraction by having joints between the slabs as it was not considered necessary, the temperature under the tank bottom being practically uniform at all times. As the different parts of the excavation were ready, the concrete was placed, always keeping a clean and rough surface to join one lot of concrete to another. The placing of the concrete was practically continuous and work was carried on night and day; about 28 working days were consumed in placing the concrete for the entire foundation, amounting to 3,340 cubic yards. The concrete slab was 224 feet in diameter, two feet thick on the 12-foot wide rim, and 18 inches thick inside of the rim. The slab of concrete when finished was perfectly level and showed no signs of cracking anywhere before the steel tank bottom was placed and no subsequent settlement of any consequence.

Loads On Foundation.

The following are the calculated loads on the holder foundation:

	On Top Of Concrete Foundation Lbs. Per Sq. Ft.	On Bottom Of Concrete Foundation Lbs. Per Sq. Ft.
At intermediate tank bottom	2,356	2,530
At landing beams	8,056	4,600
Under the tank shell	3,748	2,200
Average load on entire foundation		2,574

Time Consumed In Constructing Foundation.

Drilling test wells	21 working days
Excavating for foundation	54 working days
Concreting	28 working days

Time Consumed In Erecting And Completing The Holder.

Steel work	6½ months.
Filling tank with water through one six-inch city water main	78 hours running night and day.
Inflating holder with air, testing holder and putting gas in holder	24 working days.
Total time from starting on foundation to completion of holder and putting it into commission	10½ months.

Method of Preserving Samples of Borings Showing Formation of Soil at Foundation Site.

Careful observations were made of the foundation before and after completing the holder, and it was found that in about four weeks after the holder tank had been filled with water the total settlement due to compression of the soil amounted to an average of about half an inch, with the tank showing in its entire circumference about three-quarters of an inch difference between the maximum and minimum levels, some of which was due to the customary variation in the steel work itself. After a lapse of nearly five years since the completion of the holder an apparent additional settlement of about one-eighth of an inch, as near as can be ascertained, seems to have occurred, and this probably took place within the first year or two after the holder was put in use.

The holder was built by the Bartlett Hayward Co., of Baltimore, and the foundation was constructed under the supervision of the engineering department of the Consolidated Gas, Electric Light & Power Co., of Baltimore, which assumed the responsibility for the foundation.

Bridge and Chute for Supplying Material by Teams to Concrete Mixer.

Use of Various Gas Tars in Diesel Engines.

Harold Moore in his paper on "Fuel Oils from Coal," read before the Manchester (England) Association of Engineers, concludes, after exhaustive tests, that vertical retort tars, chamber oven tars, water gas tars, oil gas tars, and certain coke-oven tars were suitable for use in Diesel engines, providing special adaptations were used. The tars obtained from horizontal retorts and inclined retorts were considered unsuitable. Lignite tar products were classed as suitable for use without any changes in the engine."

ILLINOIS COALS.

Valuable Investigation of Cooking Qualities Made and Published as Bulletin 138.

The U. S. Bureau of Mines, department of the interior, in co-operation with the Illinois State Geological Survery and the department of mining engineering of the University of Illinois, has completed a study on the coking of Illinois coals, and has published the results of this investigation in Bulletin 138, by F. K. Ovitz. Mr. Ovitz, in discussing the subject, says:

"In its endeavor to promote a more efficient use of coal the Bureau of Mines, in co-operation with the Illinois State Geological Survey and the University of Illinois, has undertaken an investigation of the coking of Illinois coals. The investigation was started by collecting from various sources the data regarding experiments already made by others; these data have been compiled and are presented herein.

"The present methods of using coal seem wasteful. When coal is burned in furnaces for the generation of steam, only the heat generated by the fuel is utilized; possible by-products are not only lost, but frequently are the source of the smoke nuisance. The volatile matter containing the tar and heavy hydrocarbon gases is difficult to burn completely in many furnaces, and its decomposition produces black smoke. When coal is coked in a by-product oven, the volatile matter is no longer a nuisance but, on the contrary, is the source of many by-products, including benzol, toluol, gas, tar, ammonia and cyanogen, all of which increase the value that may be obtained from coal.

"The coke that remains after the volatile matter has been driven off is a valuable fuel that can be used for almost all purposes for which bituminous coal can be used, and it is necessary for some metallurgical work. It has about the same heating value as anthracite coal. Because of its cleanness and its burning without smoke, it is well suited for domestic heating and the generation of steam in plants where smokelessness is demanded. The use of coke for these purposes would do much to eliminate smoke in cities. The best grades are regarded as essential in many metallurgical processes for reducing ores to their metals.

"By-product coking in the United States during the past three years has increased greatly. When the ovens now in course of construction are completed, the total capacity of by-product ovens will be more than double what it was in 1913. This increase has led to a search for coals other than those now known to be available for use in by-product ovens. Tests with coals from the southern part of Illinois have indicated that coke from Illinois coal unmixed with other coals can be used for fuel purposes, and that coke from mixtures of Illinois coal with low-volatile coking coal might be suitable for some metallurgical work. In the tests the yield of ammonia was larger than is obtained from eastern coal.

"Evidently the development of methods by which good coke can be made from Illinois coals and the by-products recovered is a matter of high importance. Any investigation that will indicate how, by proper treatment, these coals can be made available to supply the market for coke and gas in the Middle West will increase efficiency in their use, and will aid in conserving the country's supply of high-grade coking coal.

"The first part of this report outlines the present factors in the problem of coking Illinois coals and points out the future prospects. The quality of coke from Illinois coals alone, and from mixtures of Illinois coals with low-volatile coals is described, and the uses for which coke is suitable are discussed. The gas-making properties and the value of the coals for making by-products are noted. Desirable methods of preparation of the coals, the impurities in them, and the effect of the impurities on the value of the coals for coke and gas making are considered.

"The second part of the report deals with the character of Illinois coals, their nature, physical properties, and chemical composition.

"The last part describes the tests made and gives detailed results. The tests are considered under three classes —those with beehive ovens, those with by-product ovens, and those with gas retorts.

Copies of this bulletin may be obtained free of charge by addressing the Director of the Bureau of Mines, Washington, D. C.

Slot Ovens at Auburn Junction

Indiana City Installs Six Inclined Ovens Having a Daily Capacity of 350,000 Cu.Ft.of Gas—One of the Smallest Plants of This Type in Operation

The progress made during the last several years in developing a small unit for carbonizing coal in mass has been watched with considerable interest by the gas industry. This unit commonly known as a slot oven, has given the smaller gas companies an opportunity to apply to their plants the same methods as are used in large gas or coke oven installations. Today there are in operation and in the course of construction a number of plants of the slot oven type, several of which have been described in former issues of THE GAS RECORD.

One of the "baby plants" of this type is the one now in operation at Auburn Junction, Ind., which has a capacity of 350,000 cubic feet of gas each 24 hours. The Indiana Fuel & Light Co., of Auburn Junction which is controlled by the Runyan-Ryall interests, found it necessary about two years ago to modernize its plants and to increase their capacities. After an extended investigation of the various types of plants available, the inclined slot oven was selected as best adapted to local conditions. This company, which supplies Kendallville, Garrett and Auburn Junction, decided to build the new plant at the latter place, thus replacing two former plants, one at Kendallville and one at Auburn Junction. Both of these old plants operated half depth benches of 6's.

Six Ovens Installed.

The new installation consists of two units of three ovens, each 19 feet 6 inches long, of the Russell Engineering Co.'s design. The ovens proper as well as the supporting and bracing tiles and furnace arches are built of silica materials and the slope of the ovens is such as to facilitate the easy discharge of the coke. The furnaces for heating the ovens and the recuperators are of the full depth design. The recuperators are arranged so as to heat not only the secondary air, but also to superheat the mixture of primary air and steam which is supplied under the grates. This primary air recuperator is in addition to the standard full depth secondary air recuperator and the method of using superheated primary air mixed with steam aids greatly in preventing clinkers and in reducing the fuel consumption. Ample provision is made for regulating the heats to all parts of the ovens, the combustion chambers being arranged so as not to overheat the gas generated in the slots. This heat regulation is of vital importance and is declared to have been worked out in a simple reliable way. The waste gases pass down through the recuperators into an underground tunnel flue and thence to a large chimney at the end of the ovens. This chimney was built sufficiently large to accommodate additional

ovens which it will be desired to install later.

Coal and Coke Handling.

The coal comes into the plant on an elevated tressel and may be taken either direct from the cars or from the coal storage into the receiving hopper which is located at the ground level. From thence the coal is carried by an apron conveyor to the crusher and from the crusher into a bucket elevator which discharges it into the overhead storage bunker which is large enough to accommodate 36 hours' supply. A charging larrie capable of holding one charge of coal of 5,500 pounds, runs on a track at the charging floor level over the top of the ovens. Each charge of coal is drawn by gravity from the coal storage bunker into the charging larrie equipped with a scale which accurately weighs the charge before it is discharged by gravity into the empty oven.

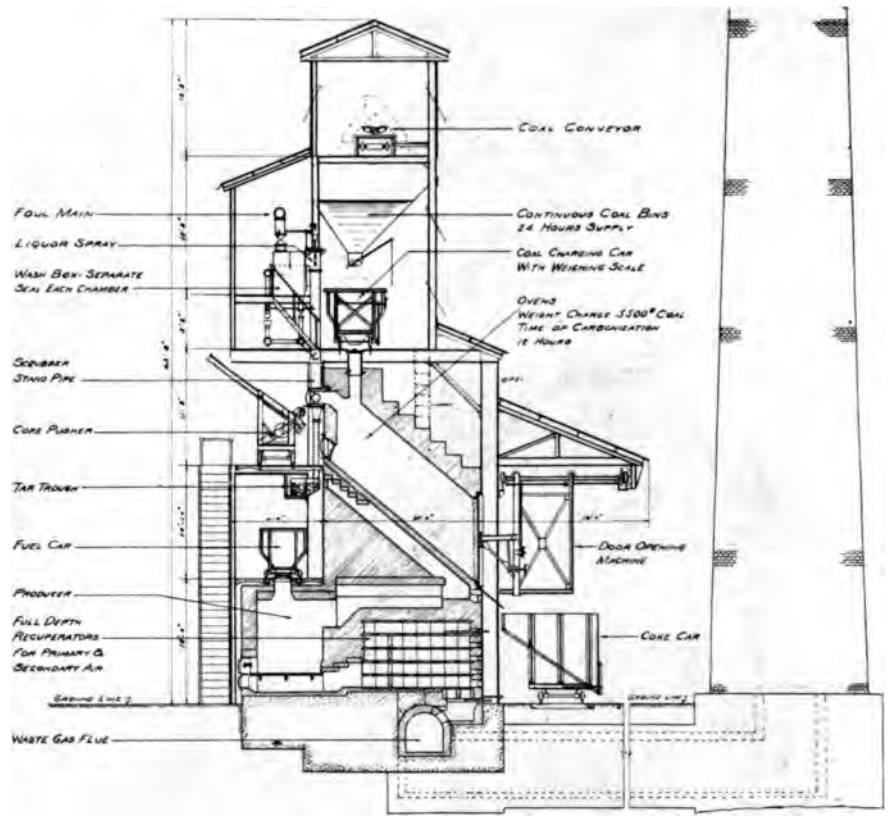
The period of carbonization at Auburn Junction necessarily varies to some extent owing to the variation in the output and the fact that no water gas apparatus is used to take up this variation. However, it has been thoroughly demonstrated that a charge of 5,500 pounds of coal can be completely carbonized in 12 hours and the resulting coke, we are informed, is of a most excellent quality, commands a high price and finds a ready market.

On the discharge side of the ovens there is a traveling platform which runs on an overhead track and carries the mechanism for removing the lower doors from the ovens after the charges have been burnt off. This apparatus as well as the charging larrie above is all operated by hand. The coke at Auburn Junction is quenched directly in front of the ovens and then is taken to the elevator which lifts it to the top of the 25-foot tressel extending to the yard storage.

Unfortunately no detailed operating figures are available for publication as the company has not as yet equipped its plant with the necessary apparatus for making accurate determinations.

The general design of this type of oven is well illustrated in the accompanying sectional view. Because of its size the installation at Auburn Junction does not include the scrubber stand pipe system shown in the illustration. This system is said to assure clean stand pipes at all times, regardless of the high heats in the ovens. The stand pipe from each chamber is provided with a separate adjustable overflow, permitting each chamber to be sealed independently while being charged and discharged.

This type of plant is said to be economical for plants ranging from 350,000 up to 5,000,000 cu. ft. of gas daily.



Sectional View of Inclined Slot Oven.

View of Plant From Charging Side.

President Fixes Coal Prices

Cuts As Deep As $1.00 a Ton From Prices That Secretary Lane Approved in June—Garfield To Be Coal Dictator—Provisional Prices Quoted

President Wilson, in a drastic executive order, recently fixed a tentative scale of prices for bituminous coal at the mines in nearly all the coal producing districts of the country. The president, acting under authority given him in the Lever bill, cut the prices agreed upon last June by the operators in conference with Secretary Lane, the federal trade commission, and the coal production committee headed by Francis S. Peabody. In some instances the president sliced more than $1 a ton off the voluntary prices fixed at that much controverted conference. "It is provisional only," the president announces, as Harry A. Garfield, president of Williams college, now acting as chairman of the wheat price fixing committee, is to be coal administrator. The provisional prices for bituminous coal at the mines as fixed by President Wilson follow:

	Run of Mine	Prepared Sizes	Slack or Screenings.
Illinois	$1.95	$2.20	$1.70
Illinois (third vein)	2.40	2.65	2.15
Indiana	1.95	2.20	1.70
Iowa	2.70	2.95	2.45
Pennsylvania	2.00	2.25	1.75
Maryland	2.00	2.25	1.75
West Virginia	2.00	2.25	1.75
West Virginia (New River)	2.15	2.40	1.90
Virginia	2.00	2.25	1.75
Ohio (thick vein)	2.00	2.25	1.75
Ohio (thin vein)	2.35	2.60	2.10
Kentucky	1.95	2.20	1.70
Kentucky (Jellico)	2.40	2.65	2.15
Alabama (Big Seam)	1.90	2.15	1.65
Alabama (Pratt, Jaeger, and Corona)	2.15	2.40	1.90
Alabama (Cahaba and Black Creek)	2.40	2.65	2.15
Tennessee (eastern)	2.30	2.55	2.05
Tennessee (Jellico)	2.40	2.65	2.15
Arkansas	2.65	2.90	2.40
Kansas	2.55	2.80	2.30
Missouri	2.70	2.95	2.45
Oklahoma	3.05	3.30	2.80
Texas	2.65	2.90	2.40
Colorado	2.45	2.70	2.20
Montana	2.70	2.95	2.45
New Mexico	2.40	2.65	2.15
Wyoming	2.50	2.75	2.25
Utah	2.60	2.85	2.35
Washington	3.25	3.50	3.00

Note—Prices are on F. O. B. mine basis for tons of 2,000 pounds.

View of Auburn Junction Slot Ovens from Discharge Side.

Opportunities for Foreign Sales of Gas Equipment.

The Bureau of Foreign and Domestic Commerce, Washington, D. C., announces the following foreign trade opportunities:

No. 25,168—A party in Italy wishes to buy pipe fittings, valves and wrought iron flanges.

No. 25,157—A firm in Italy wants 4,000 or 5,000 ton lots of steam coal, gas coal and foundry coke. Credit will be opened in New York.

No. 24,807—A company in Canada is in the market for white enameled ranges. Quotations should be f. o. b.

No. 25084—A firm in France desires gas cookers, gas ranges, gas fitting and similar gas appliances in wholesale quantities. Payment by cash on delivery of goods. Correspondence may be in English.

"Public Utility Rates," Published by Harry Barker.

"Public Utility Rates: a Discussion of the Principles and Practice Underlying Charges for Water, Gas, Electricity, Communication and Transportation Services," has been published by Harry Barker, who believes "that a comprehensive discussion of (1) such corporation and municipal activities as affect service and rates, (2) the trend of public opinion and court and commission decisions, and (3) the most important engineering and economic problems involved, would be useful to many who have to deal first-hand with one phase or another of public service." He has attempted to make the book understandable to men not technically trained, and he hopes that the book will be found fair toward all parties interested. Read the preface, which is decidedly worth while. He agrees that with the absolute disappearance of the men who organize corporations solely for the sake of large and speculative promotion profits, and not for the more moderate and certain returns of daily service, there will come a better day, for both the public and the corporations.

F. W. Seymour, for seven years superintendent of the Grand Rapids Gas Light Co., has resigned to take the management of the Calhoun Gas Co. at Battle Creek. He will also be second vice-president of that company. David W. Frazier, whom Mr. Seymour succeeds, will remain with the company as a vice-president.

Prevention of Naphthalene

Causes of Its Production and How It May Be Eliminated in Gas Manufacture Pointed Out in Paper Prepared for American Gas Institute

By Thomas D. Miller

In the proselyting work, which has engaged my attention for the past four and a half years, I have advocated the use of high heats in coal carbonization with heavy charges burned a sufficient time to completely extract the gas from the coal. The objection offered to the high heats in many instances was that standpipe and naphthalene troubles would result. In a majority of such cases, I was permitted to make a demonstration of the correctness of the theory that these evils would not follow the use of temperatures of from 2,000 degrees F. to 2,100 degrees F. in the retort, provided the charges were heavy, i. e., from 475 to 500 lbs. to a 16-inch by 26-inch by 9-foot retort. In every plant where this trial was made the expected troubles with standpipes and naphthalene did not materialize and the plants continued to operate along these lines for months, and some that I am familiar with for three years or more without any manifestations of naphthalene or unusual standpipe troubles. This confirmation of theory as to these results led to a further study of the subject and the compilation of this paper.

The most important step in the treatment of any disease is the diagnosis. Once determine the cause of the trouble, and successful treatment will result from eliminating the cause. The presence of naphthalene in coal gas seems to have been considered in the past as unavoidable, and at one time as desirable. When naphthalene troubles began to manifest themselves the production of the excess was attributed to high heats primarily and attention was given to elimination of the naphthalene rather than to methods of carbonization which would prevent the formation of this excess. As high heats were desirable, in that greater economies were obtained by their use, the excess naphthalene was accepted as a necessary evil and was treated as such.

Order of Investigation.

It must not be supposed that this paper is intended to be a complete exposition of the causes of, or remedy for, these troubles, but was compiled in the hope that the conclusions as to the source and cause of the troubles might offer suggestions as to prophylactic practice. In the making of a diagnosis of this trouble the order of investigation was.

1st—What constituents go to make naphthalene?

2nd—Under what conditions do these constituents form naphthalene?

Pursuant to collecting data, the literature on the subject was canvassed and many inquiries were made of men whom it was thought might have made investigations looking to desired conclusions. While the search and inquiries did not disclose positive and conclusive experimentation, as to the first item, the consensus of opinion was that any of the hydrocarbons of coal gas or carbureted water gas were convertible into naphthalene. (See appendix to this paper.)

As to the second item, all appear to agree on the one point that the formation of naphthalene is not a direct result of high temperatures in carbonization, but a secondary result of the heating of the gas after its generation; that all the hydrocarbons are susceptible of being cracked into naphthalene, or more complex compounds, if heated to varying temperatures for a sufficient time. Some of the more tender hydrocarbons seem to be more readily broken up than others, and this undoubtedly suggests in part an explanation for the tendency of some coals or oils to produce more naphthalene than others under the same treatment.

A coal or oil that distills readily at low temperatures will undoubtedly produce a gas more susceptible to alteration at higher temperatures than the gas from sources requiring higher temperatures for distillation. As the breaking up process in superheating of the gas, if carried to sufficient extent, will cause the dissociation of the carbon and hydrogen resulting in copious deposits of soot, any process or modification of a process of distillation which tends to reduce the formation of naphthalene will likewise tend to a reduction of soot, which is the basis of stopped standpipe troubles. The presence of an increased percentage of soot, or free carbon, in tar reduces its market value and any improvement in carbonization methods which will reduce the formation of soot, will tend to improve the quality of the tar.

The formation of excessive naphthalene in water gas practice can be brought about by excessive heats in the superheater and it may be reduced to normal conditions by decreasing those heats. As super-heater temperatures can be controlled, the production of naphthalene in water gas practice may be kept thoroughly in hand.

Naphthalene in Coal Gas.

Since naphthalene is a result of the cracking of the less complex hydrocarbons, then the greater proportion of naphthalene should be formed in coal gas practice during the earlier period of carbonization when the production of the rich gases is greatest and during the period before the body of the coal has become an incandescent mass. The final cracking of the gas occurs as it passes along the space at the top of the retort when in contact with the hot top. At that particular time the top of the retort is the hottest part of it, as the heat of the sides and bottom is being absorbed by the coal, the top remains at a higher temperature throughout the period and attains the maximum temperature of the retort.

All experience seems to indicate that, while vertical retorts make some naphthalene, at no time do they produce a sufficient quantity to cause trouble at the plant or in the street mains or services. This seems to be explained by the fact that the passages, by which the gas leaves the body of the coal and the hot part of the retort, are exceedingly small, consequently the rate of flow of gas is very high and the time of its exposure to the temperature of the surrounding walls of the retort or the body of the incandescent coke is not of sufficient duration for it to attain the critical temperature and thereby passes from the hot retort with only a small percentage of it having been broken up into naphthalene.

Ratio of Exposure and Temperature.

The cracking effect of various temperatures seems to be in inverse ratio to the time of exposure, i. e., gas ex-

posed to a low temperature for a certain period will have the same effect as if exposed to a higher temperature for a shorter period. This is the exact problem to be solved in the spacing of checker-brick for carbureter and superheater in a water-gas set. The important elements in its solution being the character of the oil used and the rate of "make" as well as the temperature which is to be carried.

The effect of time element of exposure to high temperature is very aptly illustrated in horizontal machine-charged through retorts, where the retorts are practically filled with coal. In one installation with 16-foot retorts the percentage of illuminants runs one per cent. higher than the gas produced from a precisely similar installation with 20-foot retorts, operated at the same temperature with the same coal charged with the same amount of coal per foot of retort.

Carbonization at Low Temperatures.

Carbonization at low temperature can be so conducted that there will be a practical absence of naphthalene. The gas production will be small and the crude tar production will be large. Upon increasing the temperature of carbonization the gas yield will increase and the tar yield will decrease. If this increasing yield of gas could be conveyed from the retorts without subjecting it to the cracking effect of the higher temperatures, the production of naphthalene would remain practically nil. Therefore, any system of carbonization which approaches this condition will produce coal gas free from naphthalene in just the ratio of its nearness to the ideal condition.

A certain amount of heating of the vapors of distillation is necessary to bring many of these vapors to more gaseous stability and the proportioning of time of exposure to the temperature of the generating chamber is the problem. The time of exposure must, of necessity, be reduced as the temperature is increased.

Operation of Retorts.

In the operation of horizontal retorts at high temperatures, the nearer full the retorts can be charged, the nearer this ideal condition is approached. In hand-drawn retorts the limitation is the necessary space over the charge for the inserting of the drawing tool. The inclines can approach even nearer, while the verticals come nearest to the ideal condition. Construction of the carbonizing chamber, of whatever shape, which would make possible the control of temperature of that portion through which the gas flows to the off-take pipe, would be a decided help in preventing the formation of naphthalene and soot. It is to be expected that better gas results will be obtained from slot chambers where the top and upper part of the side walls of the carbonizing chamber are maintained at a lower temperature than the portion in contact with the coal.

Higher Temperature Carbonization.

The desirability of carbonizing at high temperatures being apparent, the conclusion is obvious. In order that the gas may be taken from the carbonizing chamber without undue superheating, the conveying space for the passage of the gas should be reduced as the temperature is increased in order to secure an increased velocity of the gas in its passage to the off-take pipe. The enforced increase in the carbonizing period will not reduce the production of the setting but on the contrary, will increase it through the higher yield obtained, while the heavy charges improve the quality of the coke and the decrease in production of lampblack improves the quality of the tar.

Appendix.

A—"An opportunity offered to make a comparison between the amount of naphthalene and benzene yielded by a certain sample of coal, which was being examined with special care. When this coal was distilled in the laboratory apparatus to make a sample of gas the amount of naphthalene and benzene found in the gas at the gas works from the same coal showed a discrepancy. When it was worked back, the fact stood out as plainly as any fact could that more than 65 per cent. of the benzene which was present in the gas made in the experimental apparatus had somehow disappeared and that there was more naphthalene in the gas than could be accounted for, even allowing that the lost benzene had all gone to make naphthalene. It is but a fair inference, from general experience and the loss of available benzene, to say that somehow and somewhere in the process of gas making two benzene rings are broken up and that the residue, the broken rings united, so far as they remain coherent at all, form the naphthalene fetter. Opinion is held by men most familiar with the chemistry of the question, that the cause of naphthalene nuisance is to be found in the fact that the products of distillation remain for too long a time, relatively a very long time, in contact with the retort walls."

B—"Naphthalene is born in the retort by exposure of the nascent gas to a high temperature long enough to have it assume it, breaking up some of its heavy vapors. It is worth remarking that the production of naphthalene is not directly a function of the degree of heat employed in the bench, but rather of the temperature the gas has to assume before leaving the retort. Thus it happens that works running with comparatively high heats in their retorts, say, 1,800 degrees F. to 1,850 degrees F., do not make as much naphthalene and suffer less from it than others running at 100 or more degrees less, because in the first instance the retorts were receiving full, even and regular charges, while in the other case through lack of discipline, of good help or exigencies of the demand for gas, charges were frequently too light, unevenly put in or missed altogether."

Increasing the Charge.

C—"There is no doubt but that naphthalene troubles are greatly reduced by charging the carbonizing chambers as full as possible."

D—"I have no information as regards which hydrocarbon or group of hydrocarbons is broken up by heat and changed into naphthalene. It is a complicated reaction, and probably is affected by some catalytic action, so that it is almost impossible to hazard a guess on what the cause is."

E—"I have consulted with Dr. Wing in relation to the subject matter of your letter, and he informs me that no particular hydrocarbons break up into naphthalene when superheated, but the formation of naphthalene can be produced from any of the hydrocarbons when heated to the right temperature."

F—"A large number of hydrocarbons all the way from methane to benzol will break up yielding naphthalene among other products under the action of higher temperatures. This change does not seem to be the result of a definite and exact temperature, but any temperature which will be high enough to decompose these substances will result in the formation of more stable compounds, of which naphthalene is one."

G—"We know that the formation of naphthalene is in part a function of the contact of the gas with hot coke, and in part probably a function of the kind of coal used as well as a function of temperature. It is probable that any of the hydrocarbons will produce naphthalene if heated to a sufficient degree. They ultimately break down first into acetylene or some of the simpler hydrocarbons and then build up the more complex ones from these."

Vertical Retorts.

H—"In connection with the formation of naphthalene in vertical retorts, I would say that we have an installation of the Glover-West system of continuous vertical retorts at Fitchburg, which has been in operation for about five years, and also some at Springfield which have been in operation for a year or two. As far as our exper-

ience has gone with these retorts, the indications are that no naphthalene is formed. This is probably due to the fact that there is a cold zone of coal down through the retort and the gas generated passes up through this cold zone to the top of the retort where the take-off pipe is located. In this way the gas is not subjected to any action of heated retort walls or hot coke."

"The tar obtained in these vertical retorts indicates carbonization at low temperatures. It is very fluid and has a sort of brownish color and a very low content of free carbon, the amount being about two per cent. We have made distillation tests on this tar and have taken the oils that distilled over and chilled them down to a very low temperature, but were unable to find any naphthalene. The sulphur in the gas in form of carbon-bisulphide is less on a given coal when used in vertical retorts than in the same coal when carbonized in horizontal or inclined retorts. This also indicates low heats. An analysis of the gas, however, made in the vertical retorts showed a very high content of hydrogen, the amount being at least 50 per cent. on an average and in some instances reaching as high as 62 per cent. The hydrocarbons average around two per cent. These figures would indicate high heats.

"These two facts seem to contradict one another, and the opinion of gas engineers seems to differ regarding the reaction that takes place in the retort. Some believe that the gas when made goes toward the center of the retort, and passes up through the zone of uncarbonized coal and thereby is not subjected to the influence of heat. Other engineers claim that the coal when it begins to carbonize, forms a thick, pitchlike mass which prevents the gas from going toward the center and forces it out to the sides, making it travel up around the sides of the retorts and the coke, thereby subjecting it to heat from the retort walls.

"The tar we get from the inclined retorts at Malden and also from those at Springfield, contains an appreciable amount of naphthalene, but, as stated above, we have had no serious trouble from the naphthalene in the gas.

"In the operation of the water gas machines, if the oil is cracked at a temperature of 1,500 degrees F. or more, we notice naphthalene deposits in the purifying boxes. It can be seen in the purifying material itself and it forms on the cover of the purifying boxes. We aim to crack our oil at about 1,400 degrees F.

"It is my opinion that any group of hydrocarbon compounds that are of a mineral origin, such as petroleum or coal, will form naphthalene if heated to a sufficient degree."

Coke Oven Plants.

I—"I regret that no chemical tests have been taken at our coke oven plant, which would in any way throw light on the questions which you asked, and I doubt if any reliable tests have been made anywhere. Judging from my experience in various places, I feel sure that with a properly designed condensing and scrubbing plant, the naphthalene can be removed to such a point that not a sufficient amount will remain in the gas to saturate it at ordinary temperatures. There is no doubt that naphthalene is produced when the gas comes in contact with a highly heated body, such as the top of a retort or coke oven. I imagine that if the surface is hot enough, and the time of contact sufficiently long, that practically all of the hydrocarbons are decomposed to some extent. Therefore, the gas in a horizontal retort should be removed as fast as possible, as the temperature of the top of the retort cannot be kept below that of the remainder of the retort, but in the case of a coke oven the temperature of the top may be kept low if the original design permits it.

"I think your question is answered above, that is, immunity from naphthalene trouble would be due to a comparatively small amount being in the gas, which in turn may be due to a small production in the retort or oven, or to a large production which has afterwards been removed in the condensing plant."

Naphthalene As a By-Product.

J—"I have not enough complete analyses of the gas in conjunction with naphthalene determinations to give you any definite answer to your query, but it is my opinion that you will not find a great deal of difference in the characteristics of the gas where considerable variation of naphthalene content has been shown if the same coal is being used.

"The difference in the quantity of naphthalene observed will probably be due in most instances to a variation in the amount of the heavier hydrocarbons which are broken up, and the difference, if it could be observed anywhere, would be in the character of the tars and oils condensed. I am quite confident that this is true from a close study of the heat value content in gas made at varying temperatures from coal of practically uniform characteristics.

"Today, as you know, it is worth, in refined form, upwards of $300 per ton. Of course, it will not maintain this value after the war, but will always be a valuable by-product, and I am convinced that as the B. t. u. valuation of gas becomes universal, we will not make any effort to prevent the formation of naphthalene, but quite the contrary will scrub all our gas with oil and remove the naphthalene and benzol before it is distributed. This gives an ideal gas for distribution—stable but little affected by compression or temperature variation, free from the common trouble of continual adjustment of burners to avoid blackening and at the same time returns a valuable residual by-product."

Continuous Vertical Retorts.

K—"In Woodall-Duckham continuous vertical retorts we positively do not show any signs of naphthalene at any time I do not know whether this is due to the low production of naphthalene or to its high solubility in vertical retort tar. I am inclined to think that it is largely due to the comparatively low temperatures under which the gas is made. Our retorts are 25 feet high and the temperature ranges from 1,300 degrees F. at the bottom to 2,300 degrees F at the top. These temperatures are outside of the retort."

L—"The statement that has been repeatedly made, to the effect that no naphthalene troubles are experienced with gas made in vertical retorts, is absolutely correct. I know of no plant operating in this country, carbonizing coal in vertical retorts, either of the continuous or intermittent type, which has experienced naphthalene troubles."

M—"Analysis of the gas will show the presence of naphthalene, but, of course, in very much reduced quantities. The gas, however, seems to have the capacity to carry what naphthalene is present to the burner as stoppages are practically unknown with vertical gas."

N—"Our retort house consists of 3,000,000 feet per day of Dessau verticals. We have had no trouble at any time from naphthalene and have, therefore, paid very little attention to it. Some little time ago, as a matter of curiosity, I had tests made, resulting as follows:

	Grains per 100 cu. ft.
Outlet primary condenser	9.9
Outlet P & A	7.5
Outlet secondary condenser	7.0
Outlet of washers	3.5
Commercial gas	3.2

"The repeated statement that no troubles are experienced where verticals are used, I should say, was absolutely correct, judging from the experience we have had here."

O—"Professor Berthelot of Paris:—'A hydrocarbon does not dissolve in its elements, but is transformed into multiples or more condensed hydrocarbons, eliminating hydrogen (polymerization)'; one of his experiments consisted in heating methane, when he obtained acetylene, olefine, naphthalene and tar.

(*Continued on Page 141*)

(*Continued from Page* 141)

Quotes Prof. Lewes.

"Professor Lewes, Greenwich: 'In practice, the hydrocarbons to a great extent leave the coal as vapors of condensible hydrocarbons, and the breaking down of these to such simple gaseous compounds as ethylene is proceeding at the same time as the breaking up of the ethylene, already formed, into acetylene and methane and the polymerization of the former into higher compounds. Such bodies as naphthalene and anthracene have so great stability that when once formed they resist any effort again to decompose them by heat.

"Some pyrogenic reactions quoted from various authorities are as follows:

1—5 $C_2H_4 = C_{10}H_8$ plus $6H_2$.

2—2 $CH_4 = C_2H_2$ plus $3H_2$: $3C_2H_2 = C_6H_6$: $2C_6H_6 = C_{10}H_8$ plus C_2 plus $2H_2$.

3—2 $C_6H_6 = C_{12}H_{10}$ (Diphenyl) plus H_2: $C_{12}H_{10}$ plus $C_2H_4 = C_{14}H_{10}$ plus $2H_2$.

4—3 $C_6H_6 = C_{14}H_{10}$ plus $2C_2$ plus $4H_2$.

5—C_6H_6 plus $C_2H_4 = C_6H_5C_2H_3$ plus H_2: $C_6H_5C_2H_3$ plus $C_2H_4 = C_{10}H_8$ plus $2H_2$.

P—"Naphthalene is formed from the gas and not from the coal direct and I also believe that a large part of it is formed from the benzene series of hydrocarbons. Under the effect of heat, all compounds containing carbon and hydrogen tend to form naphthalene, but it seems that the higher the per cent. of carbon in the compound the greater its tendency to form naphthalene. Our experience with 16-foot retorts at 'A' and 'B' show that a large gas space in the retort means more naphthalene, and a comparison of the 20-foot retorts at 'A' with the 16-foot retorts at 'B' also shows that the time of contact has much to do with the formation of naphthalene.

"We have no analyses of the illuminants in coal gas but our B. t. u. and candle power tests indicate very clearly that higher and longer heating of the gas means a loss of the heavier vapors such as benzene. The order of decomposition in making coal gas hydrocarbons seems to be as follows:

COAL

	Paraffins			Olefins	
Paraffins		Olefins	Aromatics (Benzene)		Hydrogen
Paraffin	Olefins	Aromatics	Hydrogen	Naphthalene	Carbon

"The decomposition is continuous and both time and temperature have their effects, but I believe that there is a point at which a good yield of good quality gas, containing little naphthalene, is made. The problem is how to remove it at the moment it is formed. I have no data at hand on continuous vertical or inclined retorts, but I would expect them to come nearer the ideal than any other construction."

Large Versus Small Charges.

S—The relation between the volume of the charge of coal and the volume of the retort, or the relation between the area of the cross section of the charge and that of the cross section of the retort, has a very decided influence upon the quality of the gas produced and also upon the amount of trouble experienced from stoppages in the standpipes and thickening of tar in the hydraulic main. The quality of gas is at its best, other things being equal, and the least trouble is experienced when the volume of the charge is such as to almost completely fill the retort. The reason of this can readily be seen when the effects produced upon the coal and gas by the exposure to heat to which they are subjected are considered. When the charge is first put into the retort, the temperature of the coal and all of the portion of the surface of the retort covered by the coal is low, and the products of distillation are hydrocarbons of high boiling points, that exist as vapors at the temperature in the retort, but condense to liquid when cooled to atmospheric temperatures. As the charge becomes heated, however, hydrocarbons of low boiling points are given off which will remain in the state of gas or vapor at atmospheric temperatures. The interior surface of the retort has by this time again reached its ordinary high temperature and as the hydrocarbons evolved from the coal pass on their way to the standpipe through the space left above the charge, they are exposed both to contact with this hot surface and to heat radiated from it. The effect of this exposure is to break up the more complex hydrocarbons and form hydrogen, simpler hydrocarbons and free carbon and given a temperature sufficiently high and an exposure of sufficient length, the final result would be the formation of gas consisting of hydrogen and marsh gas with no higher hydrocarbons, and the setting free of a large amount of carbon. Such a gas would be non-luminous, so that, although a certain amount of this breaking up of the higher hydrocarbons after they are evolved from the coal is required to produce a permanent gas, especially at the beginning of the distillation, it is important that this portion should not be carried too far.

Gases after their formation should pass as soon as possible into a somewhat lower temperature. Since the heavy hydrocarbons or illuminants will be deteriorated by further breaking down if they are subject to too long an exposure of the high temperatures at which the olefin illuminants are best broken up. The length of time during which the gas will be exposed to this heat depends upon the velocity with which it travels, and this velocity in turn depends upon the area of the cross part of the retort that is not taken up by the charge and upon the rate at which the gas is being made. An increase in the volume of the charge for a given size of retort will, therefore, increase the velocity with which the gas passes to the standpipes, first, by reducing the area of the space through which it passes, and secondly, by increasing the rate at which the gas is made, the combined result being that the gas remains exposed to the action of the heated surface of the retort for a much shorter time, and is, therefore, much less affected by this exposure. It is true, that although the gas is less exposed to a radiant heat when the space is small and the velocity great, a large percentage of it is brought into actual contact with the surface of the retort, owing to the increase in the ratio between the perimeter and the area of a polygon that occurs when the area is reduced, and that is also exposed to contact with the greater amount of heated surface as it escapes from the interior of the charge, but experience shows that the combined effect of the radiant heat and the contact with the heated surface in the space above the charges is less harmful when the space is small and contact with the heated portion of the charge does not have as much effect as contact with the surface of the retort, since during the period in which the greatest amount of gas is given off, the temperature of the charge is much lower than that of the retort walls, as, during the first two hours the temperature of the charge does not exceed 1,200 degrees F., while that of the interior surface of the roof of the retort is in regenerative benches of about 2,000 degrees F. It is, therefore, important that the size of the retort should be so chosen that the charge, which can be carbonized in the desired length of time with the heat to be carried, will fill the retort as full as it is possible to have it and still leave room for the operation of the drawing tools.

Ben S. Allen recently with the Pittsburgh Water Heater Co.'s Kansas City branch, now is in the service of the United States, having joined the Engineer Corps at Independence, Kan.

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OPINIONS *AND* COMMENTS

ABOUT SALARIES.

A former commercial gas man who is now engaged exclusively in the electrical industry recently wrote a friend a letter in which he pointed out some of the things he had learned of the gas industry by comparing conditions that exist in the electric world. He said:

"The trouble in the gas industry as a whole, in my judgment is the need for trained men. Men big enough to see the great need of the industry and who are prepared to sell the idea of gas service to the public. Such men cannot be had at the salaries that are general thruout the industry. To illustrate, the gas industry was willing to permit the electric industry to have the lighting because they had the cooking and heating. It will wake up in about five years to find the cooking load gone to the electric side also. There are a few notable exceptions, namely Chicago, but you know that my statement is true. And the question of price does not enter into this matter at all. If it did, there would be no electric lighting in the natural gas belt. Yet the electric lighting industry is thriving like the green bay tree in competition with gas at from 25 cents to 40 cents a thousand. One thing more, how many managers of gas plants use gas for lighting their own homes? After all, am I not right in my statement that it all centers in salesmanship of the right kind?"

While the modern gas man will not admit the possibility of losing the cooking load to any competitor of gas, either in five years or fifty years, there is no well informed factor of our industry but realizes the truth of this man's statements about salaries and salesmanship. It is lamentable that an industry as big and rich as ours should as a rule permit its product to be sold by unscientific methods and by poorly paid men.

Gas as a commodity is just as capable of carrying the expense of trained and well paid salesmen as any other commodity, and it is poor management that does not realize this.

THE ANVIL CHORUS.

That the policies of this journal do not merit the approval of editors and publishers of our distinguished contemporaries is a matter of deep and abiding grief to THE GAS RECORD staff. We have labored hard and long to please 'em, goodness knows. In fact, one of the ambitions of our little group ever since this publication started has been to win an eulogy or two from the deep-stuff boys in our own line of work. It is a fearful disappointment, therefore, to note in their sheets at this thrilling juncture of history that they are dissatisfied with the way we are running our sheet.

We shall not long continue downhearted over it, though. We know the one who deliberately misquoted us recently in a neat little attempt to make officers of many gas associations hate us will continue to show his character in similar ways and means in the future. He shows it very plainly in his current issue, when he states in his own inimitable way that we did not gather our recent rate increase statistics from gas companies, but stole the material from the American Gas Institute "News." Every gas manager who got one of our questionnaires on this subject, and they all got one, will realize what an admirable character this editor has. We know the other editor who promptly caught up that misquotation and preached us a sermon on it, in spite of the fact that the correct original quotation was right before his eyes will repeat from time to time his profound lack of judgment and good sense. Both seem to harbor ineradicable displeasure against us. Yet though we sorrow intensely over these things, we shall try to plug along sunnily somehow. We expect to make increased efforts to keep abreast of the swift-moving tide of happy events in the gas industry, in the future as in the past. And up to the time of going to press, at least, our motto is still: Cheer up!

There is just one thought we would add to our haunting regrets. That gas editor who entered into labor and evolved the astonishing discovery that "Youth is indulgent, age exacting," and used it as a lead-off in his sermon on how we should run our business did not complete the triology his theme suggested. He did succeed, however, in reversing the conclusions all his predecessor philosophers of all ages had reached in regard to the qualities of youth and age. Youth and age, with their respective virtues and vices, undoubtedly exist in the field of the gas journals. But there is yet another element in that realm. We fancy, too, it is rather conspicuous just now to the discerning eye. In fact, it is so prominently displayed it should not be overlooked when the census is taken. Therefore, we make bold to mention it forthwith. Our amendment, then, to that profound characterization of youth and age would read like this:

"Youth is indulgent, age exacting"—and envy, the sorriest bird in existence to nest with.

The GAS RECORD

MONADNOCK BLOCK, CHICAGO, U. S. A.

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PROBLEMS IN THE GAS BUSINESS

Conducted by W. M. Henderson, Assistant Engineer Gas Department, Pacific Gas & Electric Co., San Francisco.

ANSWERS TO QUESTIONS.

215—Tar From Retorts.

Is there any difference in the yield of tar and such products from vertical retorts compared with the old horizontals?

I note in the August 8th number of THE GAS RECORD, in answer to Question 215 regarding tar from vertical retorts, that you say it is more viscous than tar from horizontals and that it will hold more water. Please be advised that we have made continuous vertical retort tar for three years and find that it can be pumped until the temperature is between 40 and 45 deg. F. Further, that the water content is seldom over two per cent. when ready for shipment.—V. v. Starzenski, assistant general manager, Mohawk Gas Co.

226—Waterproofing Masonry.

What is the best practice to obtain waterproof concrete walls?

From a comprehensive report submitted to the American Railway Engineers the following conclusions are selected as bearing on this question:

1. Watertight concrete may be obtained by proper design, reinforcing the concrete against cracks due to expansion and contraction, using the proper proportions of cement and graded aggregates to secure the filling of voids and employing proper workmanship and close supervision.

2. Membrane waterproofing, of either asphalt or pure coal-tar pitch in connection with felts and burlaps, with proper number of layers, good materials and workmanship and good working conditions, is recommended as good practice for waterproofing masonry concrete and bridge floors.

3. Permanent and direct drainage of bridge floors is essential to secure good results in waterproofing.

4. Integral methods of waterproofing concrete have given some good results. Special care is required to proportion the concrete properly, mix thoroughly and deposit properly so as to have the void filling compounds do the required duty; if this is neglected, the value of the compounds is lost and their waterproofing effect destroyed. Careful tests should be made to ascertain the proper proportions and effectiveness of such compounds. Integral compounds should be used with caution, their chemical action on the concrete being ascertained as well as their effect on its strength. As a general rule, integral compounds are not recommended, since the same results as to water tightness can be obtained by adding a small percentage of cement and properly grading the aggregate.

5. Surface coatings, such as cement mortar, asphalt or bituminous mastic, if properly applied to masonry reinforced against cracks produced by settlement, expansion and contraction, may be successfully used for waterproofing arches, abutments, retaining walls, reservoirs and similar structures; for important work under high pressure of water these cannot be recommended for all conditions.

6. Surface brush coatings, such as oil paints and varnishes, are not considered reliable or lasting for waterproofing of masonry.

This department will supply information on problems arising in every department of the gas industry. Your co-operation is solicited, both in asking and answering questions. Address: W. M. Henderson, Pacific Gas & Electric Co., 445 Sutter St., San Francisco, Calif.

NEW QUESTIONS.

233—Thermite.

What is the reaction that takes place when Thermite is used for welding, the welding temperature obtained, and is it suitable for use on all metals?

234—Gases.

What are the constituents, explosiveness and characteristics of these gases: Air, sewer gas, coal gas, coke oven gas, town gas, gasoline.

235—Aluminum Solder.

What kind of solder can I make to use in joining aluminum sheets?

236—Slacking Lime.

What takes place when slacking lime and what care must be taken in order to get a good quality of slacked lime?

227—Electrolysis.

What is now the accepted practice to prevent electrolysis and what satisfaction is being obtained with the use of pipe coatings?

The Bureau of Standards undertook, in connection with the general investigation of the subject of electrolysis, to test a large number of insulating coatings for underground pipes to determine their values as preventives of electrolytic damage.

The experiments indicated that such pipe paints, dips, and wrappings as have been brought to the attention of the authors are, with practically no exception, of no value whatever for protecting pipes from electrolysis when applied in the positive areas near the power houses. If, however, they are applied in negative areas they may be of considerable temporary value in reducing the current picked up by the pipe, and in that way directly they may reduce damage in positive areas.

The fact that the results of these tests are not to be considered as throwing light on the value of these coatings for protecting various metals from natural soil corrosion is emphasized; the tests were designed solely for the purpose of determining their value as a protection against electrolysis from stray currents, where the forces tending to corrode the pipes are of much greater magnitude than those producing galvanic action, which is largely responsible for slow corrosion of iron in soil. Whatever use may be made of such coatings in the negative areas for reducing the amount of current flow in the pipes, it should always be looked upon as a secondary means of mitigation only and not depended upon as a chief means of protecting pipes.

In any case, where electrolytic action becomes serious, the first and most important step to be taken is to provide a proper negative return for the stray railway currents, in order that the potential drop in the rail will be reduced to so low a value that there will be no serious tendency for stray currents to pass in transit from the tracks on to the pipes.

228—Blaugas.

What is Blaugas and how does it compare with other combustible gases?

Under the Pintsch system, oil is distilled in retorts at a temperature of 900° to 1,000° C., producing as large a quantity of fixed gas as possible. Herman Blau has modified this system, however, by maintaining the temperature of the retorts at about 500° or 600° C., thus preventing the production of a large percentage of fixed gases. The gas thus obtained is washed, scrubbed and purified as usual and stored in a holder. From the holder it is drawn into a three or four-stage compressor. Those hydrocarbons that would condense under normal conditions and hence are not desired in the final product are removed during the first and second stages of compression, while the remainder of the gas is compressed in the remaining stages to 100 atmospheres.

The tar obtained from the gas is used under the retorts, and the permanent gases which the liquefied hydrocarbons have been unable to absorb are stored in large cylinders for use in the engines supplying power to the plant.

The final product, consisting of liquefied hydrocarbons and hydrocarbon gases absorbed by them, remains liquid as long as it is kept under compression, but changes at once to a gas upon relief of pressure. At 100 atmospheres the gas is reduced to 1/400 of its volume; its specific gravity is about that of air; and it has a calorific value of 1,800 B. t. u. per cubic foot.

The explosive limits as compared with other gases are as follows, the figures being percentages of gas in the mixture:

	Per Cent.		Per Cent.
Coal gas from	6.33	to	19.33
Acetylene from	2.00	to	49.00
Hydrogen from	9.50	to	66.30
Blaugas from	4.00	to	8.00

Other figures read as follows:

	Hydrogen	Acetylene	Blaugas
Cal. value, B. t. u.	425	1,500	1,800
Contents of 1 cu. ft. retainer, cu. ft.	120	100	200
Weight of retainer to transport, say, 540,000 B. t. u., lb.	1,060	432	100
Price per 100,000 B. t. u.	1.41	1.00	0.40

Blaugas is transported in steel cylinders of various sizes, the most common being one cubic foot. This cylinder when properly filled contains about 20 pounds of Blaugas which will be converted into 250 feet of expended gas. Blaugas contains no carbon monoxide and is, therefore, non-poisonous. It is used extensively for welding and cutting, brazing, soldering and laboratory purposes, and also in districts where city gas is not available.

ABOUT MEN YOU KNOW

IT'S "CAPT." MILTON NOW.

Former Manager at Roanoke, Va., Enters Military Service—Improvements at Roanoke.

Marshall M. Milton, formerly manager of the Roanoke (Va.) Gas Light Co., resigned recently and now is captain of the 5th Coast Artillery, located at Old Point Comfort, Va. He has been very active and deserves great credit for the energetic manner in which he went after the organization of his company and for the personal sacrifices which he has made in order to do what he considered was his duty to his state and country. Mr. Milton's departure was somewhat unexpected, so temporarily W. J. McCorkindale has been transferred from his duties at Wilmington, Del., to Roanoke, until such time as other arrangements can be made. In the meantime General Manager H. S. Schutt of the C. H. Geist syndicate, is giving Wilmington personal supervision. This syndicate expects very shortly to install another water gas set, which it has already on the ground at Roanoke. At Wilmington it is just completing the installation of two 34-ft. diameter outside purifiers, a large steam-driven exhauster, an 11-ft. new water gas set and building, also a new Thomas meter and a concrete and steel coal trestle. All of which has been made necessary by the nice, steady growth which Wilmington has enjoyed the past few years.

Capt. Warren R. Thompson, until recently manager of construction and engineering of H. M. Byllesby & Co., was tendered a dinner by his friends in the H. M. Byllesby & Co. organization at St. Hubert's Grill, Chicago, Thursday, August 16, and was presented with a gold service watch. F. H. Lane, manager of the department of examinations and reports, will have temporary charge of the engineering and construction department, succeeding Mr. Thompson.

George F. Kindley has been made acting superintendent of the Suffolk Gas & Electric Co., Suffolk, Va. Mr. Kindley comes from the Henrico County Gas Co., Richmond, Va.

Ed. Morris, Southern Hustler for the "Pittsburg" water heater is carrying his left hand in a bandage due to blood poison.

Dwight Jones Enlists in California Field Artillery.

Dwight W. Jones, assistant superintendent of the Potrero Gas Works, San Francisco, has enlisted as a private in Battery B, Second California Field Artillery, known as the "Grizzlies." This regiment is now encamped at Tanforan Park, San Mateo County, California, and is made up of Californians who are enthusiastic Americans anxious to do their "bit" at the front in the cause of humanity. Dwight Jones is the youngest son of E. C. Jones, chief engineer of the gas department of the Pacific Gas and Electric Co. and is a member of the American Gas Institute and the Pacific Coast Gas Association. He was quite prominently identified with the entertainment features of the gas congress, held in San Francisco in 1915, and was a devoted worker in the interest of gas at the Collective Gas Exhibit at the Panama-Pacific International Exposition in 1915.

Dwight W. Jones, San Francisco.

Harry Warner, for years secretary and treasurer of the Spokane Falls (Wash.) Gas Light Co., has been appointed general manager of the company to succeed Robert R. Choate, former manager, who was this spring transferred to a Philadelphia holding of the Henry L. Doherty Co., which controls the Spokane concern. Mr. Warner has been with the Spokane Falls Co. for nearly 10 years.

ARTHUR KNEISEL DEAD.

Was National Treasurer of American Association of Engineers Which He Helped Organize.

Arthur Kneisel, national treasurer for the American Association of Engineers, died in Chicago, August 17, 1917, aged 37. He was one of the original promoters of the association and was secretary up to this year. Mr. Kneisel was born in Lexington, Ky., and received his early education in the Lexington schools, later graduating from the University of Kentucky. He came to Chicago over fifteen years ago and was engaged as a telephone engineer and patent attorney. At the time of his death he was president of the Utilities Development & Sales Co.

Robert Montgomery, manager of the commercial department of the Louisville (Ky.) Gas & Electric Co., has passed the examination for admission to the next Officers' Training Camp, and went to Fort Benjamin Harrison, Indianapolis, August 27. During his absence, his post will be held open for him. It is expected that T. B. Wilson, secretary of the company, will serve nominally as commercial manager, although the routine work of the department will be divided among some of the men in it. Mr. Montgomery failed to pass the physical test for the first camp, but a course of training sent him through the second time with flying colors.

Benjamin F. Harding, for the past year superintendent of the Bridgeton (N. J.) Gas Light Co., and treasurer of the company, died July 21, at Atlantic City. He was a former member of the Bridgeton City Council and elder and treasurer of the Second Presbyterian Church of that city.

G. W. Johns, manager of the Boonton (N. J.) Gas Light & Improvement Company, has resigned to become manager of the Newton Gas & Electric Co., at Newton, N. J.

W. K. Eavenson, formerly with the New York Consolidated Gas Co., and afterward with the Surface Combustion Co., now is sales agent for the Long-Landreth-Schneider Co., at their office and display rooms, 109 West Forty-seventh street, New York city.

William A. Wood, the newly elected president of the Boston Consolidated Gas Co., has been connected with that notable enterprise since March 1st, 1903, on which date he came into the organization as chief engineer, from the Syracuse Gas Light Co. On Sept. 17th, 1908, he became vice president of the company and his elevation to the office of president is just another step in his well-merited rise with the company. He is past president of the New England Association of Gas Engineers and also of the Guild of Gas Managers. In 1907 he was elected a director of

Wm. A. Wood, Boston.

the American Gas Institute. He is a member of Delta Kappa Epsilon, Phi Beta Kappa, the Masons, Engineers Club of Boston, and the Boston City Club.

W. B. Nichols, general manager of the Citizens' Gas Light Co., Quincy, Mass., has been elected president of the company.

Andrew W. Rogers, general manager of the Beverly (Mass.) Gas & Electric Light Co., is president and director, succeeding Sidney W. Winslow, who died recently.

Arthur M. Blinn, of Erie, Pa., resident manager of the Pennsylvania Gas Co., died Aug. 16th. He had been with the company for the past ten years and was manager for the past four years. He was well known, widely acquainted and well liked in the gas producing and distribution field.

B. S. Woodman, one of the best known gas men in the east, was made general manager, August 1, of the New Jersey Gas & Electric Co., which supplies gas to Dover and Wharton, N. J.

N. W. Gifford, general manager of the East Boston (Mass.) Gas Co., recently was made president of the company.

Edward C. Jones, chief engineer, and Fred C. Jones, chemist, of the gas department of "Pacific Service," mourn the loss of their mother, Mrs. Hannah Frances Jones, who died in San Francisco, Monday morning, July 9, aged 85.

Mrs. John D. Kuster, wife of the manager of the San Jose District, of the Pacific Gas & Electric Co., died suddenly of heart failure on the morning of July 4.

Official announcement is made of the appointment of M. S. Sloan as vice-president and general manager of the New Orleans Railway & Light Co.

G. W. Johns, formerly superintendent with the Boonton (N. J.) Gas Light Co., now is manager of the Newton (N. J.) Electric & Gas Co.

George W. Miner, for some years with the Memphis (Tenn.) Consolidated Gas & Electric Co., has become associated with the sales force of the Pittsburgh Water Heater Co., at the Kansas City branch.

W. J. Langenheim, who recently severed his connection as sales manager with the Hoffman Heater Co., of Lorain, Ohio, is now sales manager for the Troop Manufacturing Co., of Pittsburgh. The Troop company manufactures a full line of instantaneous water heaters, gas house heaters and hot water storage systems and is rapidly building up a large business throughout the country. A number of branch sales offices are now in operation, but it is intended to establish a branch office or agency in every large city from coast to coast.

Charles C. Foutz, formerly general superintendent of the La Porte (Ind.) Gas & Electric Co., now is assistant works manager for the Great Western Manufacturing Co., at La Porte.

P. J. Naschold, sales manager of the Nashville (Tenn.) Gas & Heating Co., succeeds C. B. Hanley, who died recently.

Tom Grant, formerly salesman for the Humphrey Co., and now captain in the National Army, has been presented with a wrist watch by his friends in the Milwaukee Gas Light Co. and several manufacturers representatives.

C. R. Jones, general manager of the International Hale Gas Mixer Co., Providence, R. I., spent a day in Chicago recently while on his way to attend the convention of the Pacific Coast Gas Association at Santa Cruz.

The Burson Supply Co., Pittsburgh, announces the acquisition of Arthur Booth as its vice-president. Mr. Booth is one of the well known and highly popular personages of the natural gas world. He has been purchasing agent for the Philadelphia Co., at Pittsburgh,

Arthur Booth, Pittsburgh.

for a number of years. The expressed pleasure of the Burson Co. over its new official is heartily reciprocated by the gas fraternity generally in recognition of this promotion.

C. A. Crowe, formerly manager of the Grand Rapids office of the Asbestos Protected Metal Co., has been appointed manager of the Detroit office, located in the Penobscot Bldg. W. W. Taber, formerly Detroit manager, has been made factory manager for the company.

W. J. Langenheim has resigned as sales manager for the Hoffman Heater Co., Lorain, Ohio, and W. T. Snow, formerly assistant manager of sales for the Ruud Manufacturing Co., Pittsburgh, has been appointed sales manager for the Hoffman company. Mr. Snow brings to his new position a wide experience in the water heater field, having been connected with the selling end of the Ruud business for six years. He has everything necessary to make a big success with the popular Hoffman.

Meet in Canada

Tenth Annual Convention Well Attended and Plumb Full of Ginger

Once more the Canadian gas men have shown that they can carry on a successful convention even amidst war time conditions—and Canada truly knows something, too, of what it means to be at war, with nearly 500,000 of her sons serving the Empire in the cause of freedom.

It was the Tenth annual convention that was held in Toronto August 29 and 30, and although many doubted whether it would be a success or not, their doubts were soon set at rest when the big crowds began to arrive from east and west, north and south. By 9:00 a. m. on the first day the convention headquarters, at King Edward Hotel, was full of delegates.

And the ladies, too, bless them, they came; many of them, all ready to share in the good things promised in the program.

There is no use talking, but that program was well arranged, because once you got started off with the crowd in the early hour of the morning, there was no getting away until the curfew bell rang at midnight. You just simply had to stay with it right through to the end. The most wonderful part of the whole affair was the number of good things you got, that one did not have to pay for. No wonder folks like to go to these Canadian gas men's meetings. When they do entertain, they certainly do it up right.

Sharp at 9:30 a. m. the ladies and gentlemen delegates left the convention headquarters for Yonge Street wharf. Here the gentlemen of the party, those who were going to attend the business sessions, embarked on the Royal Canadian Yacht Club boat and were taken to the club house on the island. Here the meetings were held. The ladies of the party embarked on one of the city yachts, and for two hours or more were given one of the best sails around Toronto harbor and Lake Ontario that one would wish to have, ending at the Royal Canadian Yacht Club house in time to partake of the excellent luncheon provided for the members and friends.

At 10:30 a. m. the business sessions opened, President J. P. King in the chair. After the usual opening remarks, the president read the executive committee's report for the year, in which was incorporated a few remarks by the president himself. The report showed excellent progress having been made, and good work done by the association during the year, also a substantial increase in new members. The report also showed every member in good standing.

Following the executive committee's report, the secretary-treasurer's report was read, showing the association to be in an excellent financial condition.

At this juncture the nominating committee for selection of office bearers for the ensuing year was appointed, who on retirement for a short time brought in the following verdict, which was put to the meeting, voted and passed upon:

President—J. M. H. Young, Supt. City Gas Co., London, Ont.

First Vice-President—C. C. Folger, Light and Heat Dept., Kingston, Ont.

Second Vice-President—V. S. McIntyre, Kitchener Light Commission, Kitchener, Ont.

Secretary-Treasurer—George W. Allen, Advertising Manager Consumers' Gas Co., Toronto, Ont.

Executive Committee—J. P. King, Stratford Gas Co., Stratford, Ont.; A. A. Dion, Ottawa Gas Co., Ottawa, Ont.; T. A. Gardner, Belleville Gas Co., Belleville, Ont.; Arthur Hewitt, Consumers' Gas Co., Toronto, Ont.; J. S. Norris, Civic Investment Co., Montreal, Que.; E. H. Caughell, Light and Power Dept., St. Thomas, Ont.

H. E. Mann, Montreal Light, Heat & Power Co., Montreal, was again elected to serve on directorate, American Gas Institute.

Following the election of officers for the year 1917-18, the reading and discussion of papers was taken up. The first paper was an exceptionally good one, by H. E. G. Watson, Manager Industrial Fuel Dept., Consumers' Gas Co., of Toronto, entitled "How Can the Smaller Gas Companies Obtain Industrial Fuel Business?" This paper is an extremely valuable one to the small town gas company manager and should be read with care by the manager who has been contemplating entering the industrial fuel field. It is published in this issue. Mr. Watson's paper evoked considerable discussion and was well received by the members present.

Another valuable paper followed, entitled "Educating the Gas Company Employe After the War." It was written and read by Dr. Lee Galloway, of the New York University, and also Director Board of Educational Control, National Commercial Gas Association. This paper also evoked considerable discussion and was likewise well received by the members in session.

At this juncture the meeting adjourned for luncheon. The directors of the National Commercial Gas Association honored the Canadian Gas Association by their presence, and arrived just in time for the luncheon.

And truly it was a great luncheon, one not to be forgotten by the members and friends assembled for a long time to come.

The mayor of Toronto, T. L. Church, a guest at the luncheon, welcomed the delegates to Toronto and hoped their stay would be a pleasant and profitable one. The address of welcome was responded to by Messrs. James T. Lynn, president of the National Commercial Gas Association, Dr. Lee Galloway, Arthur Hewitt, and others. The singing of the national anthems of Canada and the United States showed the real co-operative and loyal spirit existing between the two countries. An official

Delegates and Ladies at the Canadian Meeting.

group photo was taken in front of the club house of the whole convention party immediately following the luncheon.

At 3.30 p. m. the members and friends once more embarked on the club house boat, arriving in the city just in time to meet the private street railway cars waiting in readiness to take the party to the Canadian National Exhibition. Arriving at the exhibition the party made an inspection of the many booths and exhibits of gas appliances. The ten large booths of the Consumers' Gas Co., of Toronto, came in for a good deal of favorable comment. Other exhibits were reviewed, but the time being limited, the members made an adjournment for supper.

Reserved seats being provided for the whole party in the grand stand, the party after supper resorted thereto and spent the evening reviewing one of the greatest military and historical spectacles, illustrating Canada's fifty years' progress since the confederation of the Canadian provinces into the Dominion of Canada.

Thursday, August 30, the second day of the convention, was left open and free to all to go where they pleased, and many resorted to the exhibition, where much more time could be given to seeing the many exhibits of gas appliances, as well as to visit the government war exhibits, thrift demonstrations, exhibits of manufacturers, horticultural and art exhibits, military maneuvers, etc.

Thus ended one of the best conventions ever held by the Canadian Gas Association.

Among the more prominent delegates to the convention might be mentioned James T. Lynn, Detroit; W. Soper, Halifax, N. S.; W. M. Crane, New York; Dr. Lee Galloway, New York; Alphonso (Pop) Mason and W. C. Wardell of Philadelphia; A. P. Brill, Pittsburgh; R. A. Wallace, Quebec, Can.; H. D. Schall, Detroit; A. A. Dion, Ottawa, Ont.; J. P. King, Stratford, Ont.: Louis Stotz, Secy. N. C. G. A., New York; W. N. Johnston, Montreal; Griffin Gribbell, Philadelphia; C. Edward Bartlett, Philadelphia; J. M. H. Young, London, Ont.; W. O. Henderson, Montreal, Que.; C. C. Folger, Kingston, Ont.; H. L. Schutt, Buffalo; C. T. Mason, Grand Rapids, Mich.; Charles R. Wood, R. D. Wood & Co., Philadelphia; J. Jennings, Chicago, and many others.

BROOKLYN OUTING.

250 Commercial Men Have Clam Bake at College Point, Long Island.

Can you do the same thing three times and have very much novelty about the third occasion? Yes, if it means the annual outing of the commercial department of the Brooklyn Union Gas Co. For the third year this organization went in August to Witzels "famous" grove at College Point, L. I., for an old-fashioned clam bake. There is not much formality about this organization, and those who know Thomas Marshall Ambler, manager of the department, realize what loyalty means.

Popular Charlie Hodgson was the serious chairman who got all on board the good and fast steamer "Tourist" on the sunny Saturday. The band played "Over There" as it passed the Navy Yard where the former German express steamers are becoming Americanized. This and other tunes kept Billy Buerkle, chairman of the Gas Meeters, from getting seasick. On arrival everyone rushed for a good seat and looked pleasant for the excellent panorama that is reproduced on this page. After finishing breakfast, over half of the 250 men in the party tried to catch a rooster, but it took a football "holt" to catch him. Every one had his second wind by this time and Judge Gerlich had his hands full keeping the entrants in line. The most envied man of the day proved to be Larry Schlosser of the W. M. Crane Co., as he won the cuff buttons his firm presented for the first prize at bowling.

The prizes were something to make even the old youngsters enter the contests. They were offered by General Gas Light Co., Welsbach Co., General Gas Appliance Co., W. M. Crane Co., Geo. M. Clark & Co., and Messrs. T. M. Ambler, Alphonse Mason and W. W. Barnes. Speaking of prizes, Mr. Ambler gave neckties but his taste has improved.

The peddler's special brought out Messrs. Cammack, Dains, Stetzer, Elmer, Downs, Foster and Owens with the following scratches, Cowles, Johnson, Mason, Schultz and Hunholdt. Foster ran just like a Pittsburg makes hot water and he became a professional as the prize was real money. Harold and Geo. Humphrey rushed on the field and tried to enter when they heard what the prize was, but they were too late to register. While the athletes were ath-a-leting many were taking their swim. There was almost as much excitement in the water as there was on the running track as Emil Korthaus rescued a young lady from the briny, or was he the one who pushed the boat? Accounts differ. After Charlie Chapple and Dan Ebbets had done their celebrated imitations, all prepared for the main event, the bake. Coming down the river on the homeward journey, B. K. Johnson gave out a package of songs but otherwise there was no trouble.

Natural Gas Ass'n in U. S. Chamber of Commerce.

At the convention of the Chamber of Commerce of the United States of America to be held in Atlantic City, N. J., September 18th-19th-20th and 21st, the National Gas Association of America will be represented by: A. C. Bedford, president Hope Natural Gas Co., as national councillor and delegate; Joseph F. Guffey, general manager Philadelphia Co.; Martin B. Daly, president-general manager The East Ohio Gas Co.; W. Y. Cartwright, vice-president Union Gas & Electric Co.; John E. Gill, president Manufacturers' Light & Heat Co., and Glenn T. Braden, president Oklahoma Natural Gas Co., as delegates.

The International Acetylene Association will hold its annual convention in Chicago during October, the exact dates to be announced later.

A Safety and Sanitation Congress has been called to take place in New York City, September 10-15. It will be a mammoth affair, three large floors of the Grand Central Palace being used.

The Third Annual Outing of Brooklyn Union's Commercial Men.

Gas Light—and the Weather

Being a Little Journey Into the Realm of Science in Connection With the Placement of Lights—Thoughts for the Illuminating Engineer

By Chas. O. Bond

It has been suggested by a kind of holier-than-thou-minded element that a proper salutation on meeting of a morning would be "How is your soul?" That certainly would evince a personal interest. Some of our medical friends are of the opinion that this should be modified so as to keep our feet on the earth, and that we would better greet with: "How is your liver?" But even this query has an element of comparison in it, and is probably dictated by one whose liver is whole enough to valiantly challenge a reply —so that after all, it too, is a holier-than-thou-inquiry. It seems better, therefore, that we shall continue to use a common and impersonal topic with which to open converse, thus sparring for time and permitting each to make a shrewd guess as to the other's soul and liver before making the decision as to which way we shall rub his fir.

The Weather, Of Course.

By common accord the most useful topic answering this description is the weather. It is common. It is strictly impartial. It changes often enough to supply variety. It is beyond political or religious control and it defies the stock gambler's greed to corner it. In fact, it is about the most useful possession held in common and we should have a hard scratch without it.

This being so, each is perfectly free to discuss it, and from any angle. We all like good weather and most of us hate bad weather. And now comes the difficulty; what is good weather? It must in some way be definable in terms of the evidence of our senses. We may dismiss at once any claim of smelling or tasting the weather; and as for hearing the weather, is it not true that the evidences of bad weather are more hearable than those of good? Not only that, but the heard evidences of bad weather are in the majority of cases very enjoyable; such as the splashing of rain, the moan of the gale about the eaves, the lashing of interlaced tree tops, the continuous roar of impinging hail, the usual rattle and clang over belgian blocks softened by the fallen and falling snow to the padded sound of passing game. But we cannot measure good weather precisely by sound

The Evidence Of Sight.

There are left now for consideration the evidences of touch and sight. There is no doubt of one's capacity to feel the weather; but of the disagreeable state of mind which results from bad weather it would be interesting to

C. O. Bond.

weigh the cause and find how much of it comes from touch contact and how much from sight. It is possible to roll comfortably along in a limousine, or to sit luxuriously at ease within your club window and yet be fully bearish over the splashing rain without. Let the rain cease, the sun shine, and your mood changes to one of joyousness, though your touch sense has undergone no alteration whatever. The conclusion seems unavoidable that the consciousnness of bad or good weather is primarily determined in some way by the eye. On a dark and blustery night even we know by the roar of the wind and the splash of rain just what the weather is, but we go to the door and look out at it for confirmation of our belief.

Good Seeing Weather.

Good weather means primarily good seeing weather; mist and haze and cloud removed, a clear cut outline, a distinct shadow to help interpret it, a true value to each color in sight and a long range for vision; a light source steady, powerful and far removed so that all shadows tend to parallel; a light source so powerful that no man may look at it and hence an automatic removal of its private glare through habitual eye shading by the individual. These are the conditions under which homo likes his light furnished him, be it sunlight or be it a faint imitation—moonlight.

When his good weather fails, when he gets under cover of some sort—clouds, haze, roof—then must he modify this ideal system to retain good seeing. And to thus modify it, and yet retain as far as possible its characteristics reproduced in an artificial system, this is the target at which all illuminating engineers should aim their efforts.

The Phenomenon Of Light.

How many readers will ask at this point: "Where is this crazy man leading up, anyway?" What interest have we, as fellow engineers, in his conclusions? Just this—that selecting any subject whatever in human experience and giving it an hour's consecutive thought or examination (and thinking is the hardest work in the world), we will be surprised to find how either through actual contact or through analogy the phenomenon of light has modified our conception of it. This is as true of the spiritual and mental world as of the physical.

A friend has made some mechanical invention and hands to us his working model for inspection. All eagerness, we run our fingers over its rods and wheels and cylinders and then we rush to the window to get a true understanding of it in better light. We want good seeing! The machine is a success. Funds are subscribed, a large factory built, rows upon rows of these machines are installed and manufacturing on a large scale begins. But the output is not what was expected. Why? Well, the man of all men who should have eye access to every necessary detail of the machine at work, the man who runs

bodily risk by near contact with its powerful moving parts, the man who must hover over it for 10 hours at a stretch, this man cannot pick it up bodily as we did the model and take it over to the window for closer inspection and observation. What engineer failed to properly light those machines?

Result of Poor Illumination.

Or, the ambulance arrived and carried her off to the hospital. She was 18 and a temporary employe at a down town department store. She lived in the suburbs and suburban lighting is not as bright as that of a city's center. When she alighted from the trolley car and the car rushed off, it took time to adjust her eyes to the darkness. It is not wise to stand in the road to await this retinal adjustment, but she was as confused as a blind woman. She was a blind woman at the time the accident happened. What blinded her? Fifty minutes of bare filaments in a screechingly-lighted street car.

Is it not time—even more, is it not the opportunity—for gas men in their lighting departments to feel that for every lighting problem there can be found the best way for its solution? And if they seek out the best way and use it, then the industry as a whole gains a name for such solutions; and in gaining a name it gains popularity and lengthened years of service.

There is room for standardization of lighting—dining rooms, for instance; for thousands of them are alike. But mere campaigns for the disposal of a new light unit without a proper discrimination as to its placement can and do work harm to the industry's reputation for "good lighting."

The moral of this little verbal research is this: Let engineers especially charged with the placement of lights study to uphold their reputations for accuracy and science in such placement.

Washington Features the Chambers Range.

A simple and strong window that did enough business to warrant a three weeks' "stand" recently featured the Chambers Fireless gas range in Washington, D. C. The window showed three single oven Chambers ranges with the attractive points emphasized by bold show cards. The oven door construction was called to the attention of the passers-by. In addition to the business that resulted directly from this display, a number of good prospects turned up. G. W. Arnold, representative of the Chambers Mfg. Co. in this territory, is an old hand at the gas appliance business and is making good with the Chambers.

Santa Cruz Meet

Fine List of Papers for Pacific Coast Convention Sept. 18th-21st

The papers which have been prepared for presentation at the twenty-fifth annual convention of the Pacific Coast Gas Association at Santa Cruz, Cal., Sept. 18th-21st, cover subjects appertaining to all branches of the industry, and the discussion of these papers will no doubt bring out many important points which will be of inestimable benefit to all.

Following is the program:

President's Address—C. B. Babcock.

Who's Who; The Public; Rate Fixing Bodies; Rates; or the Company?—J. M. Berkley.

Hotel and Restaurant Fuel Sales—W. E. Dugdell.

Scientific Effect of the Use of Natural Gas, and the Use of Mixed Gas on Consuming Devices—Frank S. Honberger.

Early History of the Development of Oil Gas—L. P. Lowe.

Radiant Heat—Fred Champion.

Advertising Gas Through Appliances—A. L. Crane.

Systematic Salesmanship—Geo. P. Egleston.

Eliminating Waste—A. B. Day.

Can Profit Sharing With Employees Be Successfully Worked Out? On What Lines and Where?—R. H. Ballard.

Natural Gas—A. B. Macbeth.

Gas Heating Systems—M. L. Neely.

Gas Measurement—B. G. Williams.

Standard Flanges for Flanged Pipes, Valves and Fittings—J. P. Baloun.

Some Notes on the Industrial Use of Gas in England—Robert W. A. Brewer.

A Study of Efficiency and Utilization of Gas in Top Burners—Prof Charles Norman Cross.

Wrinkles—D. J. Young.

Experiences—John Clements.

In addition to the above the reports to be rendered by the chairmen of the several standing committees will also be of more than passing interest. The Gas Exhibit committee, under the leadership of B. S. Pedersen, promises to surpass anything heretofore attempted in that direction.

The headquarters of the association will be at the Hotel Casa del Rey, where suitable accommodations have been provided for the meeting place, the gas exhibit, and the banquet.

A. F. Van Deinse, general manager of the Springfield (Ill.) Gas and Electric Co. and of the Springfield Traction Co., has accepted a position with the engineering firm of Sanderson & Porter on the Pacific coast. He will act as general manager of one of the large plants of the company in San Francisco. The Sanderson & Porter company is one of the firms which has been allotted a number of the large government contracts for the construction of wooden vessels for the merchant marine. The company also has numerous contracts for irrigation work throughout the west.

Muskogee Gas and Electric has declared regular quarterly dividend of 1¾ per cent. on its preferred stock, payable September 15 to stock of record August 31.

Washington Display, Featuring the Chambers Fireless Range.

Conroy's Advice

Let Maintenance Cost Be Included in Rate To Avoid Annoyance

By J. P. Conroy

In treating with this subject, let us first analyze and find the object of both the company and the customer.

The gas company is not primarily a dealer in lamps, mantles or maintenance work, and its only object in handling them is, not for profit on such appliances, but simply as a means to an end; that is, to sell gas. Therefore, from the company's standpoint, its main object is to sell gas for commercial lighting.

The consumer is not interested in gas lamps, mantles or maintenance and the only interest he has in them is a means to an end; that is, a good lighting service.

Now we have before us the main object of two parties; the gas company wants to sell gas and the consumer wishes to purchase a good lighting service. It is not a fact that the quality of any kind of service is gauged by the lessening of the annoyance by the one being served; that is, by rendering a service in such a manner that the customer will not be annoyed by any little detail or have cause to ask for any special attention, or be annoyed by details of the service. Therefore, is it not fair to assume that the purchase of lamps, mantles, glassware, etc., or arranging for maintenance, is more or less an annoyance to the customer which detracts from the quality of a lighting service? The ordinary consumer knows but little, if anything, about lamps, mantles, etc., and therefore should not be annoyed with passing or purchasing things which he knows nothing about. Why annoy him with such things when you know his only object is to purchase a lighting service? Why speak to him about gas or lamps? Why not sell him a perfect lighting service?

Annoyance of Detail.

It must be remembered that there are very few, if any, commercial houses anywhere in the country who refuse to use gas for lighting on the ground that it is too expensive. Quite the contrary. They are paying a higher rate for lighting by using electricity. I believe it is not because they prefer or care which commodity supplies them light. It is because they wish to be relieved of those petty annoyances of service that, I regret to say, the gas company has allowed to exist. The mere fact of paying extra for maintenance of lamps is an annoyance to the customer, even though he knows that the cost of gas and maintenance is still less than the cost of electric service.

Realizing those things, as I am sure we all do, why is it not the best interest of a gas company to go out and sell a real lighting service without annoying the customer about gas lamps, mantles, glassware or maintenance? Adopt a good high-class line of gas-lamps, the best that can be found anywhere. Then go out and offer to install for your prospective customer a good lighting system, leaving the choice of lamps, and all details of same, to your own good judgment, which must be better on the subject than your consumer's. Let it be known, advertise the fact, that you are a lighting specialist, and that all you ask is an opportunity to prove to them that you can render a lighting service that is excelled by no other.

Avoid Talking Cost.

Avoid talking cost to your consumer as much as possible. Tell him you realize that it is up to you to render a lighting service that is as good, or better, at the same cost, or less than any other, or you do not expect to hold the business. Then sit down and work out a plan showing at what cost you can afford to furnish, install and maintain such lamps, taking into consideration the interest on the investment, depreciation on lamps and all. Then figure out how much gas you must guarantee the sale of each month, to cover such expense, leaving a fair profit for your company. Then go before your consumer and offer him a contract on those terms, to cover a period of one, two, three or more years. By so doing, you will be selling real gas contracts, not lamps or maintenance.

If this plan does not appeal to you, draw up a special contract for the sale of gas for commercial lighting, including lamps and maintenance, adding 10, 15 or 20 cents per 1,000 cubic feet to your present gas rate for this special commercial lighting service. At any rate, any plan that will relieve your customers or prospects of the annoyance of having to buy or choose lamps, maintenance, etc., will do much to improve your lighting service.

Remember oftimes the cost of lamps and installation of same may be a great handicap to a customer, or a prospect of limited means, and he would much prefer to pay a higher monthly rate for his lighting service, rather than make an investment in lighting equipment. At once make it easy for your customer to secure appliances to burn gas, and they will make it easy for you to pay dividends.

Samples of Service.

As a sample of high-class service, think of your telephone company. They do not ask you, or allow you to purchase instruments or pay for care of same. Still, you pay for it in the rate. The gum manufacturers are not only glad to supply their machines free, but pay for space they occupy to sell their wares. Think of the weighing machines, postage stamp machines, and others.

Now, as to the best method of securing customers: The prevailing plan seems to be to hire a man on a commission basis, paying him a commission on the sale based on the cost or the selling price of the appliance. I think this plan of hiring salesmen is all wrong. Again I must remind you that your main object is to sell gas, not lamps. The same lamp installed in one place such as a drug store that keeps open until late in the night would prove to be five times as great a gas consumer as one placed in a real estate office where they close over night at 6 p. m. Furthermore, a man selling appliances on commission has little or no interest in the consumer after the sale is effected, and oftimes for commission sake he will sell an appliance that displaces a better one and that perhaps if properly cared for will give better service and consume more gas. Therefore, in such cases, the gas company pays a man commission for decreasing the service to the consumer and the sale of gas for the company. A commission man will not spend much time to pacify a complaining customer or save one. Remember a customer saved is better than one gained.

All-Year Business.

The practice of hiring salesmen for a few months in the fall of the year, or through the winter months, is all wrong because commercial lighting business is not a season business, but an all-year-round business, and should receive all-year-round attention.

I think the best and only way for a gas company to secure and hold the largest amount of commercial lighting business is to employ, on straight salaries, one man or as many good men as necessary. Assign them to a certain set territory, enough so they can by hard work call on every customer, or prospect, in the district, every 90 days

or thereabouts, and keep him at it. The longer he stays in the territory the better he becomes acquainted with your customers and the better for the company. He may not be able to reap great results the first trip around, but let him keep at it until all know him as Jack, Joe or Bill, the gas man. His acquaintance will soon give him free access to all places where he can make a survey of all possible chances where gas can be used to an advantage. Let him feel he is responsible for all the gas consumed in that section, and the only commission I would consider paying him would be a commission on the increased sale of gas in the district. It is then he will see the object of not only selling appliances wherever possible, but will also see that those installed are giving satisfaction. The importance of pacifying a complaining customer lies in the fact that there is no danger of your salesman displacing a larger or more satisfactory lamp for a smaller one to get a commission.

The public will be drawn nearer to you when the people feel they have an intimate acquaintance connected with your company. Therefore I believe and feel sure that the best way to secure and hold the consumer and lighting business for the gas company is to adopt a plan of apparent free lamp and maintenance to the consumer, or let the cost be included in one rate and hire good permanent representatives and let them continue in one section, paying commission, if any, on the increased sale of gas and not on the appliances.

M. B. Carmody, superintendent of the Caddo division of the Southwestern Gas & Electric Co., at Shreveport, La., has returned from an extended trip to Chicago and eastern points, combining business and pleasure. His trip was shortened by news of his son's serious illness.

Louis J. Strause, of the Strause Gas Iron Co., Philadelphia, was in Chicago recently on business. Gas iron orders continue on the increase everywhere, it seems, regardless of the war and unsettled commercial conditions.

J. Bowdoin Cocke, for some years past the efficient superintendent of the Rocky Mount (N. C.) Gas Works, has succeeded the late W. F. Croston as manager of the gas works at Newport News, Va.

S. W. Cheney, formerly with the American Public Utilities Co., has joined the staff of the Grand Rapids Gas Light Co. as engineer in charge of construction.

Gas Heat Field

Heaviest Demand in History for All Kinds of Heating Appliances

Manufacturers of gas heating appliances, such as radiators, copper reflector room heaters, fireplace heaters and the like, are predicting for this fall the heaviest consumer demand for their products the industry has ever known. It is a well known fact that even now, when the factories are in the midst of first deliveries to gas companies, there are comparatively few appliances in the country that are not sold, and the prospects are that orders by the hundreds will remain unfilled this season.

It is a condition brought about, the manufacturers say, by high coal prices and coal shortages throughout the country, which bring the consumers to a better realization of the comforts and economies of the gas heating appliances, and also by the shortage of raw materials from which the appliances are made up.

In the eastern territory heating appliance manufacturers as a rule are completely sold out of their product for the year. There may be one or two with sufficient reserve stock to supply repeat orders for customers. Practically the same condition exists in the western territory and all other sections where the heaters are made.

There is no doubt that the gas radiator factories and the gas furnace folks will enjoy the biggest business in their respective histories. Complete campaigns of informing publicity have been waged in these lines and not only the gas company managers but the consumers have been made to understand just how advantageous are the gas systems for house heating. These factories are working overtime to supply the demand for their lines and practically all their materials are accounted for in orders now being filled. Gas managers who have delayed ordering or who continue to wait will find a hard job obtaining a stock of these appliances. The wise manager will put in his order immediately, even for his repeat orders.

Perhaps the most difficult job the procrastinating buyer will experience is that of laying in a stock of room heaters. With the wonderful improvements made in this line of appliances by the leading manufacturers, and the tremendous popularity these effective little warming plants have attained in late years, the entire output of nearly all the factories has been spoken for. One of the largest and best known of this group of manufacturers sold out the factory's capacity along about July and called in its travelling representatives. Another offered its output strictly to gas companies and announced the limited quantity it could supply. The larger gas companies throughout the country were quick to realize the unusual conditions and placed orders far exceeding those of past years. Heating appliance campaigns therefore will soon begin to show up in the average cities, and it is confidently predicted that a public demand far in excess of the supply will be felt immediately.

There is a very interesting statement in circulation now relating to the cost of heating with a well known type of gas heater. It is being sent out by a Brooklyn manufacturer and it shows the actual tested economies of the gas appliance. The statement is made from results obtained from operation of gas heaters in the "All-Package" grocery stores of Brooklyn. Fourteen of these stores are used in the comparison, which shows that in eleven of them the heating cost is less than lighting cost, each store being equipped with gas lamps of a type consuming 16 cu. ft. per hour. The average cost for heating is $4.90 per store, and $3.82 per stove, per month, with the average rate for gas around 90 cents per 1,000 cu. ft.

Henry Lowien, who has been secretary of the Alliance (Ohio) Gas & Power Co., has been made secretary of the Danbury & Bethel Gas & Electric Co. at Danbury, Conn., another property of the Doherty Co.

Among the callers at THE GAS RECORD office recently was "Gov." Hayward, of the Connelly Iron Sponge & Governor Co., New York and Boston, who gets younger and happier every year.

George Russell, formerly with the El Paso (Tex.) Gas Co., now has charge of the commercial gas arc light department of the Omaha (Neb.) Gas Co.

J. L. Tudbury, manager of the Salem (Mass.) Gas Light Co., has been elected a director to fill the vacancy caused by the death of S. W. Winslow.

Watson Suggests

How Small Gas Companies Can Obtain Industrial Fuel Business

By H. E. G. Watson

(A Paper Read Before Canadian Gas Association)

Let us take the case of a company operating in a city of anywhere from fifteen to thirty thousand people. We will assume that no efforts have ever been made to get any industrial business beyond the usual attentions given to any domestic consumer. The manager thinks that he would like some of this nice, creamy industrial business he hears so much about. How is he going to get it? He has perhaps already broached the subject to some of his business friends, but very likely he has been told that while it probably would be very nice to use gas, it being so clean and convenient and all that, still its cost is away out of all reason. It may be all right in the big cities where factories are bigger, labor dearer and gas cheaper, but not here. So our friend is perhaps almost convinced that he really has no field for this business.

Now let us look into things a little closer, and we will doubtless find there are in this city hotels, restaurants, candy shops, one or more laundries, machine shops, possibly a foundry and in addition the manufacturing industries large or small on which the city is depending for its existence as a city. All these concerns are using heat and if they are not using gas may be classed as prospects. One of the most successful of our industrial gas engineers, a man who is credited with being careful in his statements, has boldly claimed that an industry which uses heat obtained by the burning of any other fuel than gas can be legitimately considered as a prospective customer. While this may be considered as extreme, it should go far to offset much that has been said to the contrary, so that even if a certain amount of gas is already being used it will not do to consider the field covered as long as all these users of fuel have not been secured as customers.

Select Right Man.

It having been determined to look into the matter in earnest the first thing necessary is to select a man to have charge of this work and be responsible for it. Right here this paper may be a disappointment, but the writer sees no way out of it. The business of selling gas is something like a farm. The profits from it depend partly on the soil, partly on the size and location, but mainly on the amount of intelligent human labor expended on it—as a member of this association has said, "if you want to take anything out, you've got to put something in." Some companies think they cannot afford to have an industrial man. If the truth was known it might be found that they cannot afford to be without one. Leaving out the possible danger of losing a substantial part of the present business, it may easily be that they are already paying far more than the expense of an efficient selling organization in the form of the lack of substantial revenue which might be theirs with a little effort. There has been a great deal written about the qualifications of the ideal industrial gas man. He should be a kind of Julius Caesar, Newton, Faraday and Chesterfield rolled in one, and he is a pretty rare bird. Instead of hitching his wagon to a star, it may be well for our friend manager to look a little lower for something to hitch to, and if he has difficulty in securing a practical, trustworthy man from outside, let him look around in his own organization. Let him see if he has a man who seems to get along well with the people he has to come in contact with, a man who has the knack of getting at the bottom of things, has some ambition, a fair English education and some supply of that rather uncommon commodity, common sense. If no such man is available, and it is not desired to begin with an outside man, the manager must arrange to start the work himself either by passing some of his duties on to some one else, or by working harder, if such a thing be possible. Remember this is no "ginseng" proposition where you can make a fortune in the backyard with a little dawdling after supper. It means work for somebody, pleasant and interesting work, however. Even when the man is selected, he will need a certain amount of guidance and encouragement from the powers that be. It is not, however, absolutely necessary that your man start in on this work at full blast—he can gradually get into it, while at the same time training his own understudy.

Collecting Data.

Let us take it for granted that we now have our man, who is to be allowed to spend a certain amount of time on this work, which we will assume that he is at present unfamiliar with. What must he do first? We would say that there are two things which can be carried on simultaneously, first, to collect data about industrial installations, and, second, to making a survey of the field. Fortunately, it is now much easier to secure information about industrial work than it was a few years ago. He should be provided with the Salesman's Handbook, Buyers' Index and Industrial Fuel Pamphlets, all published by the National Commercial Gas Association. Next he should be furnished with copies of one or more trade journals from which he will be at liberty to clip and file articles bearing on the work. From the buyers index, the industrial fuel pamphlets and advertisements in the trade journals he can secure a list of manufacturers of industrial gas appliances, from whom catalogues should be secured, then studied and filed. All the above matter should not only be filed but indexed, so that desired information can be easily obtained. The reading and studying of all this data will provide pleasure during many long winter evenings for the man who is really interested in his work.

While all this matter is being accumulated the survey should be started. Start with the hotels, stores and factories at present connected on your lines. Do not at first try too hard to secure additional business, but get familiar with the customers, their needs and ways of looking at things. Listen to their complaints—you will be sure to get them—and try in every reasonable way to see that these complaints are looked after and the customer satisfied. After all the present consumers have been visited, start in on the others. Find out what they are using heat for and if they are willing to entertain propositions from the gas company. Although we would caution you against being too anxious to make a quick showing, the writer ventures to predict that long before this survey is finished you will begin to doubt if it ever will be finished—you will be so busy in working on installations and likely prospects.

Must Handle Appliances.

Now, then, as to appliances—you might as well make up your mind to sell them. With domestic appliances which are sold by dealers in every city, this may be a question, but most gas companies have found that it pays to handle them. Industrial appliances are not as a rule handled by dealers even in the largest cities, so your customer must buy either direct from the manufacturer or through the gas company. While the manufacturers do their best to see that the right appliance is supplied, nevertheless it frequently happens that an installation is a failure because an appliance is used for some purpose for which it is unfitted. This could be prevented if the selection had been made by an intelligent industrial man. It might be advisable not to rush too quickly into this merchandising, especially with large, expensive appliances, or with furnaces made to order

for some special purpose, but there is not much chance for trouble in supplying stock apparatus which does not run into a large amount of money. In selling industrial appliances in a small city the sales will at first be largely made from catalogues of appliances, which neither the buyer nor seller has seen. Needless to say, this is a source of trouble, but it has to be done. The difficulty can, however, be overcome to a great extent first by allowing your man to spend a few days in some city where a large number of installations have already been made—arrangements can easily be made for him to see some very interesting installations. Second, have a permanent exhibit somewhere on your own premises. It is a good idea to have some of these connected for demonstration, but the exhibit will be found very useful even if this is not practicable. This may seem to run into a lot of money, but quite an exhibit of small appliances, such as toasters, brazing blow-pipes, burners of various kinds, soldering furnaces and irons, glue heaters, tailors' irons, etc., can be made for comparatively little expense. As to larger appliances, such as oven furnaces, soft metal and cauldron furnaces, candy stoves, bakers' ovens, etc., where the amount of money involved would be more and the chances of sale possibly less, we believe that many manufacturers would be glad to make some sort of arrangement whereby a periodically changing exhibit would be supplied at very slight expense to the gas company, even if the appliances were not sold. The writer would advise that in the beginning, at any rate, you stick to the placing of stock appliances and leave "problem" work until more experience has been gained, and even then be cautious. It is well to remember that the services of an industrial engineer can be arranged for with the National Commercial Gas Association. This man can be used not only for especially difficult problems, but also to give advice on the general situation.

No Trial or Approval.

It will not be long before some one will want you to put in an appliance on "trial or approval." Unless you are in absolute need of data which can be obtained in no other way, don't do it. It only means trouble. Make sure that you can supply equipment which will fit conditions, then guarantee it to do the required work at a certain cost. This is all that any reasonable customers should ask, and you will do well to leave the other kind alone. If possible have a written order at a definite price before proceeding with any work for a customer. If you don't think this is necessary now, you will later. There are exceptions to this rule, however, as it is occasionally a help to leave some of the very small appliances on a customer's premises in order to get a foothold where no other way is possible. Where the equipment is very expensive it would probably be well at first to let the sale be made direct by the manufacturers of it, but the gas man should be on the job to co-operate with both parties. You will soon run into the man who wishes you to help him make his own appliance or to put burners in a coal furnace. Without going so far as to say this must not be done, don't encourage it. Nine times out of ten it means that the appliance will be inefficient, thus making gas bills unduly high, which in many cases means the use of gas will be discarded and you have had your trouble for your pains. Worse still, the news gets around and makes bad advertising in other places. The industrial gas appliances business today is a specialized industry, and the gas man should no more encourage his customers to build their own furnaces than the electric man encourages them to build their own motors.

Making the Installation.

It may be thought that we lay too much stress on the matter of appliances, but it is well to remember that there are three prime conditions necessary to make a successful gas sale—first, the customer must need heat; second, an appliance is necessary to supply the heat in a way to do the required work; third, the price of gas must be such as will make its use acceptable. The first condition is generally beyond your power to fulfill. The third cannot be altered in the majority of cases, so this brings us back to the appliance again, and here is where the most important part of your work comes in. Once more, get the right appliance in the right place.

Now, so far, we have only taken up a part of this work, that of making sales a very important part, it is true—but still only a part. There remains the making of the installation. No matter who does the work, it is absolutely essential that services, meters, pipe lines, air blowers, etc., be properly proportioned for the work they have to do. The appliance must be properly adjusted and the customer instructed how to use it. The industrial man should assume responsibility for all this in order to be successful. All his work goes for naught unless the bill is paid by a satisfied purchaser. Even then it pays to make a visit from time to time to see that everything is running smoothly and to see that any necessary repairs are attended to. Moreover, these visits frequently result in additional sales.

Subject of Rates.

From time to time the subject of rates will come up. We approach it with fear and trembling. It is no more than fair to say, however, that in many cases giving a reduced rate is merely granting a bonus for a customer to waste gas. Frequently a little more care in using the gas, or a more efficient appliance would save the customer more than any reduction in rates you could afford to give. Undoubtedly it is true that you can afford to sell large quantities of gas at less than your regular rates. It is just as true by selling these quantities at the established prices, more profits will be made, which is nothing to blush about. It might be well to remember that while it may cost less to supply these larger quantities, still in the present stage of the industry if it were not for the large aggregate domestic consumption you could not supply the manufacturer even at your present rates. The writer suggests that not too much consideration be given to this matter until it has been established by strict examination or sure information that the business can not be obtained at the regular rates.

Now, just one word in behalf of this young man whom we assumed to be selected by our manager—"don't muzzle the ox that treads the corn." Remember he represents your company to the most critical class of customers. He should appear efficient and prosperous. In these serious times it is pretty hard to appear prosperous on great expectations.

EHLERS' ACTIVITY.

N. C. G. A. Industrial Engineer Has Increased the Business for Over 30 Companies.

The National Commercial Gas Association has announced that its industrial engineer, W. H. Ehlers, has been engaged by the following companies since this service was inaugurated in April, 1916: Beaumont Gas Light Co., Bristol & Plainville Tramway Co., Brockton Gas Light Co., Central Hudson Gas & Electric Co., East Boston Gas Co., Eclipse Fuel Engineering Co., El Paso Gas Co., General Fire Extinguisher Co., Goshen Gas Light Co., Lansing Fuel & Gas Co., Lynn Gas & Electric Co., Malden & Melrose Gas Light Co., Middletown Gas Light Co., Mohawk Gas Co., Municipal Gas Co., National Gas, Electric Light & Power Co., Newport News & Hampton Railway, Gas & Electric Co., Old Colony Gas Co., Fenn Central Light & Power Co., Peoples Gas & Electric Co., Port Arthur Gas & Power Co., Public Service Co. of Northern Illinois, Rathbone-Sard Co., Rochester Railway & Light Co., Rutland Railway, Light & Power Co., Springfield Gas & Electric Co., C. H. Tenney Co., Utica Gas & Electric Co., Warsaw Gas Co., Wilmington Gas Co.

CURRENT ADVERTISING REVIEW

The advertising copy that has proved most successful of all the generous line recently issued by the Peoples Gas Light and Coke Co., of Chicago, is reproduced here. It features the story of "La Cigale," who, the advertisement

Chicago's Successful Copy.

says, "danced all summer and then froze with the first blast of winter." This shows how far wrong we may go in estimating the value of "copy." Nine out of ten advertising experts, we venture to say, would have condemned this choice piece as being too much "high brow." Nine out of ten would like better something on this order, especially for Chicago: "Now is the winter of my discontent; I have danced all summer and haven't saved a cent." But the classic idea pulled in more business than the modern, every day pattern, and in Chicago, too. If this proves anything, it means that the public likes to read the higher order of literature, even in advertising. There is a certain charm for all of us in allusions to classic lore. If we don't know anything about the subject it is all the more alluring, and we read every word of an article or an advertisement in hand at the time, in order to be as well informed, perhaps, as the guy who wrote it.

One of the classiest advertisements of the period is a gas bill sticker exploiting gas irons, used by the Laclede Gas Light Co., of St. Louis. John Burns has a very strong electrical competition and this sticker shows how he recognizes the gas iron as a permanent suggestion of the economies of gas. It shows, too, that he realizes the gas iron is a constant sentinel to keep out electric competitors. Taking the national motto "Thrift" as the text for his copy, the advertising man has thrown the highly popular "Iwantu" to the forefront as the most striking example of thrift in the home, and the lesson is presented in such a forceful manner that no consumer will miss the point.

Over 150,000 Thor washing machines have been sold in America. Each washer costs in the neighborhood of $100 so it is evident that the sellers of this appliance know how to get around the "high price" obstacle. The accompanying ad shows what is being done in Chicago. Note how the "$5 Down" is displayed. This high priced washing machine business seems to be headed for a big place in the gas field and the Chicago advertising suggests the line of march to follow.

The Mobile Gas Co. scored a "knockout" with a full page ad headed "Does Your Wife Enjoy Kitchen Comfort?" In each corner of the layout was a range cut and a big water heater stood out in the center. The copy fitted the medium splendidly as it appeared in an annual trade review published by a local newspaper. Comparison of kitchen conditions with those of the office must have touched a responsive chord with the financial heads of families, judging from the business this advertisement brought in.

A Laundry Machine "Puller."

A recent issue of Printers' Ink had a fine story on the advertising of the Peoples Gas Light & Coke Co. in which the newsy note of the utility's advertising policy was highly praised.

A Nifty Gas Iron Sticker.

FIELD OF FINANCE

Cities Service Company July Earnings.

The gross earnings of Cities Service Co. for the seven months ending July 31, 1917, were $1,075,767 in excess of the figures for the calendar year 1916 and only $1,500,000 short of equalling the total gross earnings for the first five years of operation. The gross earnings for the first seven months of the current year, $11,186,110, were over two and one-third times greater than for the comparative months last year, and the balance for the common stock, $8,902,131, was over two and three-quarter times greater than for the same period last year. The gross earnings for the twelve months ended July 31, 1917, were $16,559,107, this being over $693,000 in excess of the results for the twelve months ended June 30, 1917, the previous record period, or nearly two and one-half times greater than for the preceding year. The balance for the common stock was $12,948,382, or over three times greater, and equivalent to 55.55 per cent. on the common stock compared with 25.83 per cent. for the twelve months ended July 31, 1916. For the twelve months ended July 31, 1917, the preferred dividend requirements were earned five times compared with three and one-third times for the same period last year. In accordance with the policy of reinvesting surplus earnings in the properties, the total earnings thus available as of July 31, 1917, were $22,565,785.

Consumers' Stock Plan Success in Baltimore.

The Consolidated Gas, Electric Light and Power Co. of Baltimore issued a statement summing up the results of the plan formulated two years ago of offering the stock of the corporation to consumers. Up to June 30, 1917, the statement shows that 2,332 consumers had been enrolled as purchasers of the common stock, the total shares subscribed by them being 15,177, amounting to $1,721,034.50. The offer of the stock to consumers on advantageous terms was made on June 10, 1915, the price named at the time being $106.50 a share. At the close of the company's fiscal year on June 30, 71 consumers completed the payment for 345 shares. The management says that the plan has been mutually advantageous, and many of the subscribing consumers are renewing their subscriptions.

Western Gas & Elec. Shows Increased Net.

An increase of 10.6 per cent. is reported in the net earnings of Western States Gas and Electric Co. for the month of July, compared with July, 1916. Net for the year ended July 31 was 6.9 per cent. ahead of net for corresponding previous year.

For the six months ended June 30, the Union Natural Gas Corporation earned gross of $4,828,840, and a balance after dividends of $1,740,013.

Public Utilities at Brandon (Man.) Can. Change Hands.

Negotiations have been completed for the sale of the Brandon (Can.) Electric Light Co.'s plant to the Canada Gas and Electric Corp., which is composed of American financiers. The purchase price is approximately $1,000,000. It is the intention of the new company to also acquire the Brandon Gas Co.'s plant and make large extensions.

United Light and Railways Declares Regular Dividend.

The regular quarterly dividend of 1½ per cent. has been declared on the first preferred stock of the United Light & Railways Co. A dividend of 1 per cent. was also declared on the common stock. Both dividends are payable on October 1, 1917, to stockholders of record at the close of business Saturday, September 15.

Pawtucket Gas Company Makes Almost 12% Gain.

The sales of the Blackstone Valley Gas & Electric Co., of Pawtucket, R. I., gas department for June, 1917, showed an increase of 11.9 per cent. over the previous year, and those of the electric department a gain of 15 per cent.

CONSTRUCTION NEWS

NEW FRESNO PLANT.

P. G. & E. Co. Will Spend Over $450,000 Rebuilding on New Site.

The Pacific Gas & Electric Co. will begin at once the construction of a new gas plant at Fresno, Cal., and will utilize a great deal of the material now in its present plant. The removal of the old plant and the erection of the new, contemplates an investment, apart from the cost of the new site, of $450,000. Of this amount, $200,000 represents an added cash outlay, the balance of the authorized expenditure being included in the equipment taken from other plants. The increase over the present equipment is to include a one million foot holder, a 15,000 barrel oil tank, two new Jones' improved gas sets, new battery of purifiers, new 450-horse-power boiler, besides additions and improvements.

New Retorts in Use by Allentown-Bethlehem Co.

Allentown-Bethlehem (Pa.) Gas Co., in order to relieve the heavy strain upon the Allentown plant, recently threw into service their new Bethlehem retorts, adding a capacity of 750,000 cubic feet daily, all of which is used in the Bethlehem district, where there are approximately 10,000 patrons. This company, in order to serve its growing patronage throughout the valley, is increasing the capacity of the Allentown plant from 3,000,000 cubic feet daily to 5,000,000 daily by the erection of new retorts and other equipment. From the Allentown plant the entire territory is served, except in cases of emergency, when Bethlehem plants are thrown into service. The extraordinary heavy use of gas during the summer months has taxed the plant to its utmost, and it is believed that during the coming winter the consumption will show a very heavy increase, due to the high prices of anthracite.

Eau Claire Spends $100,000 on Plant Improvements

The Wisconsin-Minnesota Light & Power Co., Eau Claire, Wis., has completed improvements to its gas plant involving an expenditure of more than $100,000. A new 250,000 cubic foot holder has been erected and additional benches installed which double the capacity of the plant.

Northampton Stores Oil for 5-Mos. Supply.

The Northampton (Mass.) Gas Light Co. recently constructed a 70,000-gal. oil tank. The tank is connected with the railroad siding by a pipe line. It will hold about enough oil for five months' supply.

New Holder for Economic Gas Co., Los Angeles.

les, Calif., is planning the erection of a The Economic Gas Co., of Los Ange- new gas holder.

Alma Plant To Be Given Increased Capacity.

It has been announced that the Gratiot County Gas Co., of Alma, Mich., will immediately break ground for a new building with a view of greatly increasing its capacity. The new building will be of brick, two stories in height and 40 by 60 feet. New benches and retorts will be placed in this structure and the capacity of the plant increased about half.

The company started three years ago is enjoying a great success and is now furnishing gas for four Gratiot towns and is considering going into others in the near future. Breckenridge, Ithaca, St. Louis and Alma are the places which are now being supplied by the company. R. B. Wagner and E. J. Wagner, former Grand Rapids men are interested in the company.

GAS LITERATURE AT A GLANCE

Conducted by R. S. McBride and C. E. Reinicker, Bureau of Standards, Washington, D. C.

Purification of Naphthalene.

By Thomas B. Smith. "Gas World," 66, 10; (Coking and By-Products Section) (June 2).—The principal ways of freeing crude naphthalene from the "mother oil" which it carried are as follows: (1) Sublimation, in which the naphthalene is heated in an iron vessel and the vapors pass to a jacketed chamber containing coils in which cold water or steam can be circulated. The vapors are first condensed by the cold coils and then the naphthalene melted by heated coils, and run into cooling pans. (2) Sweating, in which the naphthalene is heated nearly to its melting point and the lower melting oils partly drained out. (3) Centrifuging. The oils are expelled from the crystals by a centrifugal machine. (4) The cold crude naphthalene is pressed to partially remove the oils. The press is then heated nearly to the melting point of the mass and further pressure applied. (5) Low-grade naphthalene, especially, is distilled from shallow wrought iron stills and the naphthalene fraction is collected and crystallized.

Naphthalene from any one of these processes can be further refined by washing it in an agitator when just above the melting point, successively with soda lye, sulphuric acid, and again with soda lye, after which it is distilled. Sometimes pyrohesite of dichromate of potash are used to ensure a permanent white color. As sold, naphthalene must be white, volatile without residue, melt between 79 and 80 degrees C., be soluble in benzene to water white solution, distill nearly completely within 1 degree, and color strong sulphuric acid only faintly pink. —D.

After Expansion or After Contraction of Fire Bricks in Oxidizing and Reducing Atmospheres.

By Dr. J. W. Mellor. "Gas Journal," 138, 504; (June 12) and "Gas World," 66, 452-5; (June 9).—The writer calls attention to the fact that ferrous iron has a far greater fluxing action than ferric iron so that the contraction of a brick fired under reducing conditions will probably be greater than when fired under oxidizing conditions, providing no bloating occurs. Nearly all fire bricks are fired under oxidizing conditions. A table of measurements are given showing results obtained in contraction tests under the two conditions. The results show a general tendency for silica bricks to give less expansion in reducing than in oxidizing atmosphere and for fire clay bricks to give greater contraction in reducing than in oxidizing atmospheres. The magnitude of the fluxing effect induced by reducing atmosphere depends upon (1) the strength of the reducing atmosphere, (2) the rate of gas penetration into the interior of the brick, (3) on the time and temperature the brick is in the reducing atmosphere. It is recommended that the "contraction test" be conducted in as nearly neutral atmosphere as possible.—D.

Hot and Cold Sizes of Fire Bricks.

By Dr. J. W. Mellor, "Gas Journal," 138, 503-4; (June 12) and "Gas World," 66, 452-5 (June 9).—The object of the experiments was to get an idea of the difference between the hot and cold size of typical fire bricks as they occur in the open market. The measurements were made in a Copper's apparatus. Two cuts are made in the brick, each intended to hold a pointed platinum wire. The distance between the tips is measured when the brick is cold by a cathetometer with an invar scale, and again when hot through suitable apertures in the furnace. The results of these tests on bricks of various materials are tabulated. The writer states that if the brick is imperfectly burned there is superposed on the effects of thermal expansion, an after-contraction or after-expansion. He finds that the brick does not contract to its original volume on cooling, the difference between sizes when cool, before and after heating shows the magnitude of after-expansion or contraction. It is found that the thermal expansion is masked by the after contraction, which leads to doubt in regard to the measurements of thermal expansion of refractories at high temperatures which have been reported. The tests show that the coefficient of expansion of fire clays and silica bricks decrease with rise of temperature.—D.

Rendering Bodies Transparent by Coal Tar Products.

Editorial. "Gas Journal," 138, 590; (June 19).—The trustees of the British Museum have made application in the patent court for a license to use a German patent for rendering organic bodies transparent and transluscent to light by the use of certain coal tar products. Animal organisms treated with these compounds may be brought to the necessary degree of transparency for exhibition or research purposes. The principal is that the body after treatment is placed in a liquid having the same index of refraction as the body. With the proper treatment every bone in the specimen is perfectly clear to the view not as a shadow but "in the round" and the muscles, arteries and other tissues can be severally traced.—D.

Ignition Points of Liquid Fuels.

By Harold Moore. "Engineer," via "Gas Journal," 138, 626; (June 26).—In the original article the writer deals exhaustively with the spontaneous ignition temperatures of liquid fuels, that is, the temperature at which a substance surrounded with oxygen or air at the same temperature will burst into flame without the application of a spark or other local high temperature. The article is accompanied by a table of the ignition points of the more important liquid fuels. These include oil and water gas tar distillates, these are themselves, raw tars from various coal gas processes, and various coal tar distillates, including benzol, toluol, creosote, oil, etc.—D.

Methods of Measuring Stocks.

By H. F. Boughton, "Gas World," 424; (June 2).—The writer describes methods for measuring various gas works stocks, which he states is simple and expeditious. A correct plan is made from observations and measurements with a ranging pole and pocket sight clinometer. The area of the plan is then obtained by a planimeter and the various thicknesses of the piles, by trigonometric ratios. Having obtained the volumes of the various piles the weight of coal in tons is computed by dividing the volume by 43 if the moisture content is normal. If abnormal he divides by 42. In measuring coke from horizontal retorts a divisor of 85 is used with normal moisture and 80 if abnormal. For vertical retort coke he uses 95 and 90 respectively. Percentages for coke, dust, and breeze vary and can only be determined by measurements at each particular works. For separated breeze and dust and for all other substances not less than ¼ cubic yard should be measured and weighed. Retort carbon if stacked roughly in not excessively large pieces may be taken as 51 pounds per cubic foot. The writer emphasizes the importance of correct measurements and the inadvisability of being acquainted with the book stocks before measuring. He states that the method described by him gives wonderfully correct results.—D.

Spontaneous Firing of Coal.

By Dr. J. S. Haldane. "Gas Journal," 138, 633; (June 26) and "Gas World," 66, 492; (June 16).—The writer states that there has been no doubt for several years that the spontaneous heating of coal is due to an oxidation process occurring under conditions which will not allow the escape of heat as readily as it is liberated. In the case of a large mass of coal with air passing through it continuously in a given direction, the heat produced in one layer is carried forward to another and in each successive layer there is a rise in temperature. When the mass of coal is large enough to permit of very unequal temperatures in various parts, this may occur. Coal that has been warmed by the sun, or by proximity to some source of heat, is specially liable to ignition under favorable conditions. Even though previous exposure to the air may have exhausted the substances oxidizable at ordinary temperatures the rise in temperature renders further substances liable to oxidation, so that the oxidation is again started. In warm weather special care is necessary not to stack coal in too thick a layer.—D.

Second Report of the Joint Committee on the Life of Gas Meters.

By the Committee. "Gas Journal," 138, 504-13; and "Gas World," 66, 455-60; (June 9).—This is a lengthy summary of the work which has been done during the past year in ascertaining the conditions affecting the life and operations of consumers' gas meters. —D.

The Leerdam Dry Gas Holder.

By E. A. Daalen. "Hot Gas," via "Gas World," 66, 483-4; (June 16).—In this article additional particulars to those in the "Gas World" of May 26 are given. In this holder there is no tank. There is simply a stiffened shell closed by a moving disk or basin, the circumference of which makes a gas-tight seal with the inner wall of the shell. The building of the holder occupied four months with only one mechanic and the balance, unskilled labor on the job. The holder is 52 feet in diameter and 45 feet high. One advantage of the holder is lesser weight for a given capacity as compared with a holder of standard type. For example, in Leerdam only 53 piles were put down for foundation where a tank holder would have required 150. The metal weight is about the same in both types of holder the absence of water in the dry type making the difference. The holder is polygonal in cross section having 14 corners. In the bottom of the holder is an annular trough to catch the tar which leaks through the seal between the shell and movable disk. The tar is circulated back to the seal by a pump. The moving disc is guided by rollers moving on the inside of the shell. Around the edge of this disc is a trough containing the sealing tar. The bottom of this trough is formed by wooden wedges with springs making a loose sliding fit with the shell.—D.

Effect of Ammoniacal Liquor on Reinforced Concrete.

By E. Ott. "Chemiker Zeitung," via "Gas World," 66, 493; (June 16).—A gas liquor tank showed signs of leaking. The liquid which escaped contained ammonia, free and fixed, and thiocyanic acids, but no hydrogen sulphide or sulphuric or hydrochloric acids. The ammonia salts in the liquor had attacked the free lime in the concrete, forming soluble calcium salts. Coating the inside of the tank with materials such as tar is only partly effective as it is difficult to avoid the development of cracks. A suitable lining to the tank is to be preferred—lead, iron or glass being suggested. Where iron is used it is recommended to keep the atmosphere of the tank free from air to avoid rusting. For this purpose coal gas is recommended.—D.

Methods of Purification.

By W. T. P. Cunningham. "Gas World," 66, 471; (June 9).—In replying to a statement which had been made that artificial or reclaimed oxides are often more active than natural bog ore because of the higher percentages of ferric hydrate which they contain, the writer maintains that this statement is open to grave doubt. In reclaiming oxide by burning out the sulphur, not only is the valuable peaty fiber burnt out, but the oxide is put into the form of ferric oxide which is not a form favorable for purification. On the other hand, the bog ore is often obtainable with 70 to 75 per cent. of ferric hydrate which gives better results than higher percentages would. He considers it a mistake to judge a purifying oxide by the percentage of ferric oxide which it contains. The quality and condition of the iron are the factors governing efficiency. D.

German Owned Coal Tar Dye Patents.

Reported in "Gas World," 66, 493; (June 16).—The British Dyes Limited applied recently in the patent court for a license to use a further series of German inventions for the manufacture of coal tar dyes. At the beginning of the year this company applied for licenses in respect to twenty-three patents and now in respect to thirty-two more. One of the patents now applied for covers flavine, which British doctors have discovered, possesses remarkable antiseptic properties. Others of these colors, one a brilliant green, have been found to possess antiseptic properties. It is a question whether under the existing English laws, it would be a penal offense to buy flavine as a dye and sell it as an antiseptic. The comptroller states that the main difficulty is the puzzle of the name. It would lead to confusion if flavine were sold under the same name both as a dye and as an antiseptic. The court must insist on all firms manufacturing the antiseptic under the same title.—D.

Research in Refractory Materials.

By Cosmo Jones, before Iron and Steel Institute, May. "Gas World," 66, 15; (Coking and by-products Section) (June 2).—The writer points out that the effect of alkalies found in certain coals upon refractories used in oven construction is serious and that little is known of the destructive influences at work. Subsequently he directed attention to the absolute importance of gas-tight partitions in the case of coke ovens and stated that while the contraction of burnt clay is fairly regular with increased temperatures, silica has an inversion point at which it become trydimite. In the presence of certain compounds this inversion takes place below the coking temperature. The remedy was to avoid rapid temperature changes and when ever possible to raise the temperature of the material during the burning stage of manufacture above the inversion point, holding it there long enough to complete the inversion.—D.

Breeze Briquetting Plant at Beckton.

Anonymous. "Iron and Coal Trades Review," via "Gas Journal," 138, 519; (June 12).—The plant at Beckton comprises a Yeadon roller press and accessories. The breeze is tipped from trucks over a screening grid into the hopper from which it is raised by a bucket elevator to the feed chamber above the shoot which feeds the disintegrator. This shoot is bridged by a magnetic separator to remove any pieces of iron passed over with the breeze. The arrangement of other parts of the plant is such as to ensure uniformly steady running. The machine has an output of three tons per hour of briquettes of 1½-ounce weight. A man and three boys are employed in the operation. The power required to operate the plant is about 20 b. h. p. It is expected that the moulds will produce 1,000 tons of briquettes before requiring renewal.—D.

Benzol Recovery and Refining Plant for Small Gas Works.

By D. Bagley. "Gas Journal," 138, 575-6; (June 19).—The author describes and gives a diagram of a benzol recovery plant designed to handle outputs of gas plants of 100,000,000 cubic feet per year. Rectification of light oils is recommended in plants of 500,000,000 annual output. The refining apparatus is fully described.—D.

PRAISES COMMITTEE.

Quartermaster's Dep't Appreciates National Gas and Electricity Committee's Work.

The national committee on gas and electric service has been actively cooperating with the advisory commission of the Council of National Defense and with a number of the departments of the government that are actively engaged in various measures for the prosecution of the war. The committee has been able through its close touch with the gas and electric utility companies to be of special service to the Quartermaster General's department in connection with the troop cantonments and it has received the following letter from Col. I. W. Littell, expressing appreciation of its services:

"This office wishes to express its appreciation of the very valuable service rendered by your committee in connection with solving the problem of obtaining electric power and gas supply where required for the cantonments for the National Army. Due to the information furnished by your committee, a large amount of investment in temporary power has been saved to the government.

"Time did not permit using your services in connection with the National Guard camps in the same manner as they were used in connection with the National Army cantonments, but even under these circumstances your services have proven very valuable in connection with the National Guard work.

"This office also wishes to express its appreciation of the uniform courtesy and efficiency of your local representatives.

"By authority of the Secretary of War: (Signed) "I. W. Littell,

"Colonel, Quartermaster Corps,

"In charge of cantonment construction."

Following is the membership of the committee:

John W. Lieb, chairman; William H. Gartley, vice-chairman; Walter R. Addicks, Philip P. Barton, John A. Britton, Alex Dow, Chas L. Edgar, A. E. Forstall, Joseph F. Guffey, Samuel Insull, D. C. Jackson, Joseph B. McCall, Wm. E. McKay, Herbert A. Wagner, S. S. Wyer.

NEW PRODUCTS

Premix Roaster

Successful Installation of Industrial Burner in Davenport Coffee Mill

A highly successful installation of the Maxon Premix industrial burner has been made by the Tri-City Railway & Light Co. at Davenport, Iowa. These burners were installed for the Halligan Coffee Co., who roast the celebrated "Pure Quill" brands of coffee. This installation has been in operation for practically two months and has given perfect satisfaction in every way, as to cost of operation and maintenance of equipment.

The cut presented herewith is descriptive of the way the installation was made. The outlet from the blowers carrying the mixture of gas and air is a 1½-inch pipe which extends to the back of the roaster and through the setting in the rear, and attaches to the burner underneath the roaster proper. This burner is made up of 2½-inch pipe, four feet long, with three rows of holes drilled in the top, one drilling being directly on the top of the burner and the other two drillings being practically at an angle of 20 degrees. The total number of holes is 144 and they are ⅛-inch.

In order to obtain a more uniform flame, the 1½-inch pipe was inserted on the inside of the 2½-inch. This 1½-inch pipe contained forty-eight 7/32-inch holes, these being drilled down. In this method the gas conveyed into the burner through the 1½-inch pipe passes out downward and expands around the 1½-inch pipe inside of the 2½-inch pipe, which makes the mixture travel in the direction of the flame propagation when leaving the drilling in the top of the 2½-inch pipe.

As to the cost of operation, the consumption is approximately eighty cubic feet per bag of 100 pounds of green coffee. This makes the cost per bag, with eighty cent gas, 6.4 cents.

The cost of roasting, when using pea coal or crushed coke, with the present prices of fuel, was approximately from eight to nine cents per bag. However, in addition to this saving in fuel per bag, the Halligan Coffee Co. is able to secure a more uniform grade of coffee than was possible before installing gas. They have also speeded up their equipment by the installation of gas, for with a coal roast the best time that they could make was approximately thirty minutes per roast. With the gas installation and figuring the same size roast, they are able to turn out the same in nineteen or twenty minutes time, which is the same as speeding up their equipment 33 1/3 per cent. They are at present operating four roasters. This would mean that, to turn out the same amount of coffee in the same amount of time with coal as with gas, they would have to have approximately two more roasters to give the same capacity of plant as they are doing with gas.

The "Premix" Roasting Coffee at Davenport.

Data on the New Buckeye Traction Ditcher

Observations by W. H. Bagley, of the Osage & Oklahoma Gas Co., in connection with trench digging, are given in a leaflet entitled "Human Leaks," recently issued by the Buckeye Traction Ditcher Co., Findlay, O. The new Buckeye Ditcher is also described in the leaflet.

New Toaster Announced by Roberts & Mander.

The Roberts and Mander Stove Co. of Philadelphia announce a new toaster for commercial use. This appliance was developed after considerable experimental work in connection with a prominent gas company. It is said to be just the thing that restaurants need. Bread is toasted without turning. This "Quality" toaster will toast 8 or 10 slices of bread, on both sides, within 100 or 120 seconds.

The Gwynn Crown Burner Clears Itself.

A heating burner that cannot clog is said to be the latest improvement in the Gwynn line of Standard burners—it cleans itself. This improvement eliminates the tendency of gas inlet to clog, thus reducing its flow and impairing efficiency of burner, according to the Gwynn Co. Four air intake tubes at base are so arranged that all dirt or other matter which might find its way into inside of burner, automatically slides out through these openings. Burner is said to measure 4½ inches high by 3 inches in diameter and weighs 18 ounces. An opening in bottle is drilled to receive ⅛-inch nipple furnished with each burner and for purpose of attaching burner to manifold.

General Electric Co. Issues Index to Bulletins.

The General Electric Co., Schenectady, N. Y., has issued a 16-page index to its supply part bulletins, which may be obtained from that company on request.

The new edition of "The Franklin Idea in Steam Heating" is of considerable interest to the gas man who wants to be thoroughly informed on all up-to-date gas heating appliances. This publication will be sent free by the Franklin Co. of Canton, Ohio.

1000 C.P. Gas Lamp

Welsbach Co. Announces Big New Fixture for Large Area Lighting

The "1,000 candle power lamp" that gas men generally have been asking for in the past three years is out at last. It is the leader in a lot of new gas lighting equipment just now announced by the Welsbach Co., of Gloucester, N. J. This amazingly brilliant unit is sure to find instant popularity throughout the gas industry, for it not only fills a demand that has already been created, but also will prove a powerful stimulant to gas lighting interest wherever it is seen or installed. It signifies one of the greatest forward steps gas lighting has ever taken. It is hardly necessary to state to informed gas men that his new Welsbach achievement surpasses in illuminating efficiency and in beauty of design anything the rivals of gas lighting have to offer.

The Welsbach 1000 C. P. Lamp.

It is Georgian design and a big, massive, handsome fixture. The length over all from top of canopy to bottom of bowl is 42 inches. The width of the bowl ring is about 24 inches.

This fixture was designed purposely for the lighting of large areas where high intensities are required, such as public buildings, gas company show rooms, department stores, churches, etc. The fixture can be quickly converted from a five to a ten or fifteen light unit or used separately according to the amount of light required.

Tests on water gas at 25/10 pressure show that when equipped with fifteen Reflex No. 33 mantles and without bowl it gives the following candle power:

The Welsbach 1000 C. P. Burner.

Directly below the lamps 1023; 1140 at 45 degrees and 906 on the horizontal.

Among the special features of the lamp are one chain pull, pilot filter body, C-C lighter, hinged bowl ring, etc.

This fixture is now ready for the market.

CONCEAL-O WINDOWS.

The N. C. G. A. Service To Feature the New Attachment in Its Display.

R. Williamson & Co., manufacturers of the well known and popular "Conceal-o" attachment, has sent the following letter to gas companies:

"As a subscriber of the window display service of the National Commercial Gas Association you no doubt will be interested in the window display featuring the safety gas connection, or in other words, the 'Conceal-o' and its various unions and adaptors. We are offering you our service to assist you in getting together the material required for this display and will be pleased to have you advise us whether or not you intend to make it and at what time.

"The 'Safety First' movement, which is receiving the hearty endorsement of the gas companies throughout the country, can be given no greater aid than the substitution of the 'Conceal-o' connection for the antiquated, unsafe and unsightly slip-on rubber end that has not as yet altogether disappeared from general use. There are some companies who have gone so far as to eliminate these old connections entirely and we trust you will find it to your advantage to also look into it with this end in view.

"The 'Conceal-o' will increase gas consumption because it provides a safe and desirable outlet for portable gas-consuming appliances.

"May we not hear from you on this subject at an early date?"

Windows are Connecting Links in Campaigning.

The simple but attractive window display, shown herewith, of the Wisconsin Public Service Co., Green Bay, was used during the hot water week. Geo. L. Wilkins, new business manager, of the company, co-operating with the sales promotion department of the Pittsburg Water Heater Co. is conducting a direct mail campaign, sold 26 automatic water heaters in five days. Mr. Wilkins says, "this record was due to the efficiency of the campaign in which the five windows played a prominent part."

Big Window Display of Pittsburg Water Heaters.

POVERTY COWARDS

By Harry Gale Nye

If I ever write a book the subject of it is going to be "Poverty Makes Cowards of Us All." If I should ever preach a sermon that is going to be the text. In either case it would be a description of the business men I have met who are poor because they had poverty cowardice.

It is When a Man Goes to a Bank to Borrow That He Runs Into the Acid Test of Business.

The difficulty with nine out of ten small business men is that they think they are too poor to take a chance instead of realizing that they are too poor not to take a chance. This does not apply to men who simply want to make a living. Any man who wants to make only a living has no business being in the game for himself, for he is simply a natural born employe. With small capital a man is liable to feel that he is not able to buy goods in quantities large enough to get the short price, and he loses the extra profit the short price would give him and gets poorer still. He feels that he is too poor to buy the most modern tools and machinery for his shop and he grows poorer still by the loss of time and the low quality work done with inferior tools and machinery. He is afraid to advertise because it will take a few dollars out of his diminutive bank account and the result is that the men in his line who do advertise get the business and the coward's bank account dwindles still smaller. He is just a small business man and always will be.

You see such a man amass wealth just about as often as you see a family going into a "Family Entrance."

Way back in the early days of the West when every mining camp had its gambling house, late at night when the plungers were all broke or had gone home with a roll, there were always a few pikers left with a small quantity of chips. Under such circumstances it was the invariable custom of the dealer to cash in the pikers at two dollars for one in chips to get them to quit. Why? Because the few dollars of the piker were not worth the winning, but with them he had a chance to break the bank if he had a run of luck. The piker could afford to take the risk, for he had little to lose, but the banker could not because he had so much to lose. The world has a fortune in it for any piker who will play his chips boldly.

Leisure to Beat an Inoffensive Little Gutta Percha Ball All Over the Cow Pasture.

This very thought should change the wishbone of the small business man to a backbone.

It is the man who plays his small capital bravely who at last gets the leisure to beat an inoffensive little gutta percha ball all over a cow pasture. It is not Divine Providence or Providence, R. I., that favors him; it is his nerve. The trouble with the small business man is that he has done his saving in hundreds and he is too prone to think in hundreds, spend hundreds and consequently make hundreds. The man who thinks in thousands, makes his contracts in thousands and buys in thousand lots is the man who makes the thousands. A tool costing fifty dollars is not a good purchase when one which turns out thrice as much work, or turns out work thrice as well can be bought for one hundred. There will always be the saving of one man's time, or of doubling the quality of one man's work, which is the same thing.

Try to keep in mind that ten per cent. profit on one hundred dollars is just one-tenth what it is on a one thousand dollar deal, and yet the time, effort and ability required to pull off one is not a whit less than the other. It is when a business man goes to a bank to borrow money that he runs into the acid test of business. The banker knows that a man who borrows in thousands, pays interest on thousands and all other things being equal is a better risk than the man who borrows in hundreds. The thousand dollar borrower is liable to be a bigger, broader gauge business man than the hundred dollar borrower, so is likely to pay more promptly. If a man has

He's Afraid to Advertise Because It Will Cost a Few Dollars.

only a few hundred dollars he should not let it weaken his backbone.

The man in business who has a weak backbone is like a jitney piano that anybody can play on if they have a nickel.

His few dollars are too little for him to play the short priced horses in the business race. All a man can lose is what he has and the man with little is risking less than the man who has a lot. Let him study his proposition, his contract, his business, from every possible angle, and then when he has made up his mind that he is right let him back his opinion with his bank roll. This is exactly what every man has done who has pulled himself out of the

He Would Be Better Off If He Tried to Increase His Loan.

rut of small business and climbed to the top.

It is not conscience which makes cowards of us all—it is poverty, and there is many a man now passing down the wrong side of the street to avoid a creditor who would be better off if he was trying to increase his loan.

Earl Wagner, formerly advertising manager of the East Ohio Gas Co., now is in charge of the Cleveland office of the W. D. McJunkin Advertising Agency, having been elected a vice-president of the organization.

W. L. Wood, Jr., manager for the Southwestern Gas & Electric Co., at Shreveport, La., was in Chicago recently on business and met Mrs. Wood who has been spending the summer in Michigan.

Town Votes Raise

Rock Hill Gas Company Wins 25 Cent Increase in Election

Rock Hill is a small town in South Carolina. It is typical of hundreds of small towns throughout the United States. The Rock Hill Gas Co. has been valiantly struggling for the past year or so to furnish the people of Rock Hill with the conveniences and economies of gas for domestic lighting and fuel purposes. The war conditions struck Rock Hill and made a big dent in the revenues of the Rock Hill Gas Co., just as they made similar dents in the revenues of every gas company in this country, large or small. The Rock Hill company struggled on bravely until quite recently, when it became plainly apparent to Manager E. R. Guard that the dent in his revenues was growing too large to permit further inaction in regard to it. The company auditor had informed him that the sheriff waited just around the corner, so to speak.

Mr. Guard felt confident the service his company had been giving the citizens of Rock Hill was appreciated. He also had confidence in the intelligence and reasonableness of his community. So he sought out the city commissioners, who govern Rock Hill and regulate the gas company, and laid his case before them.

Company Losing Money.

"Is the company actually losing money by the service it is rendering this town?" they asked him.

"It is actually losing money," he replied.

"Are you willing to give the city an audit to prove it?"

Mr. Guard was not only willing; he was anxious. The audit was made, the commissioners were satisfied and a popular election was called.

The question submitted to the voters in the election was this: Shall the gas company be permitted to raise its rates to consumers 25 cents per 1,000 cu. ft.?

The price of gas in Rock Hill before the election was $1.50 gross, $1.40 net after discount for prompt payment of bills.

The following letter from Mr. Guard dated August 24, speaks eloquently of the result of the election. It says:

"We won yesterday by popular vote an increase in the price of gas of 25 cents per 1,000 cu. ft. Our new rate will be $1.75 gross, $1.65 net, the raise to take effect September 1."

It was later ascertained that only eleven citizens cast their votes against the proposed raise in gas rates. The Rock Hill Record, the newspaper of that section, in a leading editorial following the election, paid its respects to these eleven objectors and at the same time laid down to its readers some basic principles in relation to public service. These principles should prove interesting to everyone who seeks to promote closer co-operation between public utilities and the communities they serve. The editorial says:

Newspaper Comment.

"We are glad to note that there were only eleven who voted against the local gas company raising their rates to a place where they could meet their expenses and continue to do business here. We hear that some of these parties who voted against the increase stated that they were paying too much now and were going to cut theirs out; others kicked because they were not given the same rate as the biggest concern in Rock Hill that has a contract to use a large amount each month. It is really remarkable that some people cannot understand that they cannot enjoy the city privileges in a country town without paying for them. If Rock Hill was as large as Charlotte or Columbia, then we would no doubt be able to secure a rate of something like $1.25; still there are large cities that pay as much as the $1.40 we have been paying previously. Rock Hill is a small place—practically, you might say, a country town—and very few places of this size have a gas plant, and, in order to have these conveniences, which are usually only found in big cities, we must pay for them, but still we have a few who think they ought to live in a country town and enjoy all the privileges of the cities at the same price. It is not possible to have these things unless they are paid for. You cannot ride in autos at the price of a horse and buggy; you cannot have up-to-date hotel service at boarding-house prices; so if there is not enough population here to furnish enough gas consumers who can support the gas plant and keep it going, and we want to enjoy these conveniences we must pay for them enough to allow the plant to exist, for no concern can exist, no matter what it is, that is not making expenses.

NATURAL GAS DEVELOPMENTS

United Fuel Gas Co. Strikes Rich New Well.

W. Y. Cartwright, vice-president of United Fuel Gas Co., has announced that well No. 926 brought in on Big Sunday Creek has been drilled further and is good for 200 barrels of oil and 15,000,000 cubic feet of gas daily. Twelve additional wells are now being drilled on the same tract. While United Fuel Gas Co. has been exploring for oil in Big Sunday Creek and other tracts for some time, work has not been pushed, as the company has been occupied in erecting plants for extraction of gasoline from natural gas obtained from existing gas wells. The Columbia Gas & Electric Co. owns 51 per cent. and Ohio Fuel Supply Co. owns 49 per cent. of the stock of United Fuel Gas Co.

Ohio Cities Gas Earnings for July Huge.

A statement of July earnings and the consolidated balance sheet of the Ohio Cities Gas Co. has been sent to the stockholders by President B. G. Dawes. The earnings include those of the Ohio Cities Gas Co. proper and the newly acquired Pure Oil Co. For the month of July, the company earned a total of $1,011,578 net after taxes. No comparison is available because of changes in the corporation since a year ago.

Mixed Gas in Anderson, Ind., in November.

Mixed manufactured and natural gas for Anderson, Ind., will not be going through mains until probably November. The Central Indiana Gas Co., according to the management, has been delayed in preparations for manufacturing gas at its plant by slow shipments of material. Until mixed gas is served there will be no change in the prices for gas. A new schedule will not be in effect it is thought for at least two more months. The original intention was to start the gas plant in September and change rates at that time.

Rate of Return Depends on Reasonableness of Investment.

Public utilities are entitled to earn, over and above their necessary operating expenses and a proper amount for depreciation, a return on capital honestly and prudently invested in property used in the public service. Re Middlebourne Gas Co. (W. Va.) Case Nos. 490, 491, Dec. 29, 1916. A natural gas distributing company will not be permitted to earn a return upon the full value of its plant established in occupied territory in competition with and at a much greater cost than the existing plant, where the total investment is in excess of the needs of the community, since the excess investment must be considered as having been imprudently made.

1916 GASOLINE REPORT.

Big Increase Over 1915 in Production from Natural Gas Shown in U. S. Report.

Statistics just completed under the supervision of John D. Northrop, of the United States Geological Survey, Department of the Interior, show that the year 1916 was one of marked expansion in the natural-gas gasoline industry in the United States. The quantity of raw gasoline extracted from natural gas, including that produced by the compression and absorption methods, as well as that obtained by the use of vacuum pumps and recovered as drips from gas-transmission lines, and sold in that year was 104,212,809 gallons, a gain of 38,848,144 gallons, or 59 per cent. over the output in 1915. The quantity of commercial gasoline represented by this output of raw casing-head product, though not susceptible of actual determination, was probably more than 200,000,000 gallons.

The average price received in 1916 for the unblended product at the sources of production was 14 cents a gallon and the market value of the entire output was $14,408,201, a gain of 6 cents in average unit price and of $9,257,378, or 180 per cent. in total value, compared with 1915.

The volume of natural gas from which this quantity of gasoline was recovered is estimated at more than 208,800,000,000 cubic feet, the average recovery of gasoline per thousand cubic feet by all methods being about half a gallon.

The number of plants for extracting gasoline from natural gas increased from 414 at the beginning of 1916 to 594 at the end of the year, a gain of 43 per cent., whereas the combined daily capacity of all plants increased from 232,336 to 484,448 gallons, or about 108 per cent.

The following table shows the sources of casing-head gasoline produced in the United States in 1916:

Gasoline extracted from natural gas and sold in 1916:

State.	Number of plants.	Quantity Gallons.	Value	Average recovery of gasoline per 1,000 cu. ft. Gallons.
Okla.	116	49,079,722	$ 5,942,198	1.968
W. Va.	147	18,765,056	3,025,293	.179
Cal.	26	17,158,754	2,293,822	.691
Pa.	195	9,714,926	1,726,173	.252
Ohio	53	2,638,571	470,804	.485
Ill.	32	2,260,288	262,664	1.688
La.	7	2,113,159	269,564	2.329
Tex.	4	1,292,811	201,023	1.363
Ky.	5	725,467	141,347	.129
Kans.	3	215,000	35,030	.132
Colo. N. Y.	6	249,055	40,283	2.422
	594	104,212,809	$14,408,201	.499

Cambridge City (Ind.) Natural Gas Plant Sold.

The Cambridge City (Ind.) natural gas plant was sold recently to A. B. Ayers, of Fortville, and F. M. Milikan, of Indianapolis, Ind. Mr. Ayers is president; Sherman Strong, vice-president; F. M. Milikan, secretary and treasurer.

Personal Items from the Gas Field.

Dana D. Barnum, of Worcester, Mass., has been elected vice-president, in charge of the manufacturing department, of the Boston Consolidated Gas Co. He is a past president of the New England Association of Gas Engineers and formerly was chairman of the technical committee of the American Gas Institute. At present Mr. Barnum is president of the Guild of Gas Managers of New England and is a director of the American Gas Institute.

D. M. Moore, formerly with the Hope Natural Gas Co., has just completed a training course at the officers' training camp at Fort Benjamin Harrison, Ind., has been commissioned a captain in the United States reserves.

W. J. McCartney, formerly with the General Gas Light Co., but now located in Detroit, is promoting an oil and gas proposition in Columbia, S. C. He was calling on friends and customers in Chicago the latter part of August.

E. A. Wright, manager of the Manhattan (Kans.) Gas & Electric Co., has resigned to accept a similar position with the Trenton (Mo.) Gas & Electric Co.

Benjamin J. Allen, superintendent of the older gas plants of the Boston Consolidated Gas Co., died suddenly, July 29.

John W. St. John, since 1908 secretary and treasurer of the Madison (Wis.) Gas and Electric Co., and one of the leading spirits in civic organizations, leaves Madison, October 1, to become assistant general manager of the St. Paul (Minn.) Gas Light Co. His successor has not yet been named.

Mr. St. John's appointment to the St. Paul position is a promotion, as the American Light & Traction Co. of New York controls the properties of both the Madison and St. Paul companies.

Thousands of Delighted Women Sit Down to a Happy Meal

after having enjoyed an "afternoon off" while the entire meal was cooking, unattended, in the oven.

The Direct Action Gas Range with Oven Heat Regulator

has brought a new freedom to the housewives of today—a freedom from the drudgery of "pot-watching."

With the menu book that goes with each Regulator Range, a woman can prepare in about forty-five minutes, an entire meal—including a roast, vegetables and dessert—without any preliminary cooking on the top burners.

This meal she places in the oven at one time, and allows to cook, unattended, while she enjoys the "afternoon off" at the matinee, or any other afternoon pleasure, and finds the meal ready for serving when she returns.

Not only does she enjoy the relaxation of an afternoon of leisure; but she enjoys the satisfaction of knowing that the meal will be cooked so deliciously that it will rival the work of the best chef.

When are you, Mr. New Business Manager, going to take advantage of the Regulator to give added interest to the sales talk of your solicitors?

She placed the whole meal in the oven and it was all cooked at one time without any "Pot Watching."

NATIONAL STOVE CO. DIV.
AMERICAN STOVE COMPANY
LORAIN, OHIO

CONCEAL-O

"The lively sale of portable gas appliances depends very largely upon the convenience and safety of the tubing and connections that can be supplied."

"A display of the

CONCEAL-O

system of connections and wall plates will be a revelation to many of your townspeople and is bound to arouse the interest of every passer-by whose house is piped for gas."

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Factors Retarding Gas Light

Present Status and Future of This Business Outlined by President of Illuminating Engineering Society—His Views on Combination Companies

By Wm. J. Serrill

The status and prospect of gas lighting was discussed by Wm. J. Serrill, president of the Illuminating Engineering Society, in his presidential address to that organization. The cause of artificial illumination would suffer if this illuminant should greatly decline, declared Mr. Serrill. Competition is a healthy state. In the general good of the cause, it is the policy of this society to foster and develop all types of artificial lighting. I shall make no attempt to urge the advantages of gas lighting, as they are sufficiently set forth by those whose business it is to exploit them. I shall approach the subject from another side, considering briefly, one by one, the obstacles, or handicaps, which in the past have stood, which to some extent still stand, in the path of gas lighting, tending to retard its progress, and to weaken it in its competition with other illuminants. The discussion will naturally involve some consideration of the prospect of the abatement or removal of these obstacles. I shall not name these handicaps in the order of their importance, nor attempt to classify them from that standpoint, but shall begin with the qualities of the fuel and follow along in the natural order, to the policies and practices surrounding the introduction and maintenance of the burners.

Lack of Uniformity in Quality.

The first obstacle to good gas lighting to be considered is a lack of uniformity in the fuel delivered to the burner. This does not mean that only one quality or kind of gas should be made all over the country; generally speaking, any of the gases that are in vogue anywhere, are satisfactory, in the sense that existing types of gas burners may be adjusted to give efficient results with them. It

Wm. J. Serrill.

does mean, however, that when burners are once adjusted and in use, it is highly desirable that the fuel thereafter fed to them be kept uniform. It thus becomes a problem for the individual manager in each city, or territory that is separately supplied. The modern gas burner, being a creature of small orifices and delicate adjustments, if it were endowed with the gift of tongues, and with a knowledge of what is expected of it, would cry "uniformity, uniformity," with every molecule of its structure.

In the past principally two kinds of gases have been general, coal gas and water gas. In recent years coke-oven gas has become an important factor with many companies. These gases differ from each other in gravity, in heating power and in air requirement, i. e., the volume of air necessary completely to burn a unit volume of the gas. Many important considerations have led the larger gas companies to equip themselves with apparatus for making two of these gases, and to distribute a gas that is a mixture of the two. Under these conditions the maintenance of a desirable uniformity in the gas, at all seasons, is not easy.

Candle Power Standard.

The effort to maintain a standard candlepower as the one standard quality of the gas has been the principal cause of variability in the other qualities. This standard candlepower quality, now happily in process of abandonment, but still enforced in many cities by governmental ruling, or contractual agreement, can be maintained in the gas as delivered to the burners during the changing temperatures incidental to the seasons, only by varying the proportions of the gases in the mixture, or by processes of enrichment; and these changes automatically cause those vari-

ations in the other qualities of the gas which are harmful to the cause of good gas lighting. Candlepower as a quality of the gas is useful only on the open-flame burner. It has no value in the incandescent gas burner; on the contrary, the effort to maintain it introduces effects that are detrimental to incandescent gas lighting. Thus it is seen that the whole course of the development of incandescent gas lighting, since the first introduction of the Welsbach burner, has been retarded and handicapped by the enforced adherence to an obsolete and harmful quality in the gas. The least efficient, the most wasteful, type of burner has been coddled to the positive detriment of that type on which the future of gas lighting depends. It is one of the bright spots in the future of gas lighting that this incubus is in process of abatement. By common consent, the gas industry is abandoning the candlepower standard, in favor of a heat-unit standard, for the gas. In many towns this transformation is an accomplished fact; in others—and these include some of the larger cities—it may not take place for several years.

Other Causes of Variability.

However, even with this principal source of variability removed, the maintenance of a desirable uniformity in the gas is still a question demanding the constant attention of the manager When working to a heat-unit standard a uniformity of air requirement and of gravity is more easily maintained than under a candlepower standard, but it will not maintain itself. It will continue to exist only as a result of unceasing vigilance. Economic and labor conditions demand, for many cities, that a fairly standard quantity—sufficient for the summer output—of coal gas be made and that the extra quantity for the winter consumption be supplied by water gas, made only during that season. This means a gas of varying qualities, and the problem confronting the manager in such cases is how to introduce these changes with the least possible effect on the incandesecent burners—how to maintain a gas calling for a nearly constant air requirement, as the proportion of water gas intermixed gradually increases, and then, after reaching a maximum, gradually decreases with the approach of spring. Some of the ablest minds in the industry are now engaged on the different phases of this question.

Again, unexpected or unforeseen conditions some times arise, which tend to destroy uniformity. The present shortage in the coal market, due to the great war, may be cited as an instance. This condition has forced some companies, which have been distributing water gas for years, to swing over to coal gas. In such a change the incandescent gas lights are bound to be affected, but with the absence of a candlepower standard to be maintained, and with a new sense of the importance of uniformity which the modern manager possesses, even such changes will produce a smaller detrimental effect on the gas lighting conditions than formerly.

Another source of variability, of a type that is entirely inexcusable, arises out of the manager's failure to realize the serious effect produced by sending out, even temporarily, an unscrubbed gas, or one containing constituents that normally are removed. It usually arises in this way: Some alteration, replacement, or renewal in the gas manufacturing plant is undertaken, without any provision being made for the temporary treatment of the gas during the interval that elapses between the taking out of the old installation and the introduction of the new, on the assumption that, for so short a period, a gas that is not normally treated will do no harm. This state of the managerial mind, once quite prevalent, is growing scarce. He knows now that he may, in a few minutes time, by omitting precautions of the nature indicated, seriously affect his gas lighting business.

Incandescent Lighting.

The candlepower standard has been an obstacle in the path of incandescent gas lighting, not only by tempting consumers to keep the uneconomical open-flame burners in use, because of the high candlepower of the gas, not only by rendering it impossible for the manager to distribute a uniform gas such as is demanded by the incandescent burner, but also by the psychological effect it has had on the gas manager himself. It has lulled him into a sense of false security. By tradition thinking largely in terms of the open-flame burner, the enforced maintenance of the candlepower standard, conserving a quality in the gas that is useful only on that type of burner, has emphasized this thought, thus measurably retarding the day, now happily dawning, when the manager faces about, and for the first time looks squarely in the face the requirements in the fuel that are demanded by a good incandescent gas lighting service. At no very distant period in the past, all gas lighting was by the open flame. Gradually the incandescent type has replaced the open flame, but quite gradually, and by no means entirely, even to this day. The open-flame burner is indifferent to wide variations in the quality of the gas, so long as the candlepower is maintained. How natural, when a candlepower standard is in vogue, to rest comfortably in the thought that by maintaining this standard, one has done his whole duty by gas lighting! Fortunately for the future of gas lighting, the manager now knows differently.

Uniform Pressures.

The demand for uniformity by the incandescent gas burner is not, however, completely met by the unbroken delivery of a gas of uniform quality. This uniform gas must come to the burner under uniform pressure. To variations in pressure are due many of the causes of dissatisfaction with gas burners. The rules of the public service commissions of the several states usually provide a maximum and minimum pressure permissible at any burner, and an allowable degree of daily variation above the minimum. These provisions are seldom unreasonable. The gas manager well knows that the requirements of a satisfactory lighting service call for a variation considerably less in volume than the variation these rules generally allow.

Strictly uniform pressures are possible only on high pressure systems, with a governor on each service. Pressures approaching this ideal of uniformity may be obtained on low pressure systems, such as the majority of gas distribution systems are, by utilizing a system of feeder mains, or a belt line filled with pumped gas and provided with governor stations located so as to feed into the distribution system at numerous points. Such devices, of fairly recent introduction, enable the manager to maintain more uniform pressures throughout his territory than formerly, and to do so at a less charge for capital investment. The modern tendency to carry higher pressures generally, causes automatically a smaller percentage of daily variation in the pressure at any point in the main system. These causes, in connection with a keener appreciation on the part of gas managers regarding the importance of pressure variations as a factor in the gas lighting service, are gradually removing what has in the past constituted a serious handicap.

Greater ease in maintaing a uniform gas at the burner is not the only benefit the cause of gas lighting enjoys by the abandonment of the candlepower standard. An additional advantage lies in the smaller quantity of condensable hydrocarbons in the gas. Adherence to the candlepower standard required the maintenance of a fair, sometimes a large, quantity of such condensable content, while compliance with a reasonable heat unit standard permits a material reduction of it. In a properly adjusted burner, the presence of such hydrocarbons in their normal vaporous form is unobjectionable, as they are completely

consumed in the burner, but the seasonal variations in temperature—in the mains underground, in the basements, and in the interiors where lamps are located—whereby the temperatures in these three places vary so that each in its turn may become higher than the other two—these seasonal variations bring about the condensation of part of these hydrocarbons, and its deposit in liquid form. The presence of this liquid deposit, becoming solid or semi-solid when subjected to burner temperatures, has in the past constituted a serious obstacle to a good gas lighting service. These deposits have been the cause of what is sometimes popularly called a "dirty" gas, now happily disappearing with the exit of the candlepower standard. Compliance with a heat unit standard permits of a sufficient reduction in the condensable hydrocarbons to prevent any deposit under ordinary seasonal ranges of temperature, thus securing greater insurance against those lighting troubles which these deposits cause. Here again we see one of the handicaps under which incandescent gas lighting has labored, in process of abatement.

Sulphur in Gas

An evil incidental to the modern forms of gas lighting, which was not so objectionable with the open-flame burner, arises out of the presence of traces of sulphur in the gas, in the form of carbon bisulphide and several obscure sulphur compounds. The ordinary methods of gas purification, which effectively remove all traces of the ordinary sulphur compounds, do not touch these special combinations of sulphur. The burning of the gas, however, destroys them and liberates the sulphur in the form of sulphurous acid. The quantity so liberated into the atmosphere is so small as to be unobjectionable; indeed, the atmosphere of rooms lighted by gas does not show any higher percentage of atmospheric sulphur than does the ordinary atmosphere of our modern cities, which is charged with this substance to a greater extent than formerly by the combustion of solid fuels in house furnaces and manufacturing processes. However, while these traces of sulphur are negligible as vitiators of the atmosphere, their presence in the products of combustion issuing from gas burners, nevertheless, produces certain other objectionable effects which gas lighting would like to dispense with. It is a factor in increasing the discoloration of burners and fixtures, and of walls and ceilings, caused by the continual impingement of these products of combustion. If these products were absolutely devoid of sulphurous acid it s probable that the objectionable discoloration of burners and fixtures would be materially reduced.

The darkening of walls and ceilings, which constitutes one of the greatest handicaps under which lighting by gas suffers, is not caused solely by the sulphurous acid in the products. The presence of this compound, however, is a potent factor in causing it, and the complete removal of the sulphur would materially retard the growth of the stain, and also diminish its intensity. The removal from the gas of these obscure sulphur compounds is, unfortunately, not easy, and it is expensive. The subject is engaging the attention of the ablest chemists and engineers in the industry, and the outlook for the development of a feasible process of purification that will entirely eliminate them, is by no means hopeless. If gas lighting is to hold its proper rank in the field of artificial illumination, the accomplishment of this object is important.

The elimination of condensable hydrocarbons from the gas, incidental to the transfer from a candlepower to a heat-unit standard, by removing a tendency to cause smoke due to clogging of orifices in the burners, is another factor in lessening the evil of darkened walls and ceilings. Not anything that it is in the power of the gas industry to do, however, will entirely remove this objection. Caused by the impingement of atmospheric dust carried by warm air currents, this effect is seen above, or near, any object whose temperature is such as to induce currents of air. The effect is proportional to the volume of the current and the length of time during which it impinges, assuming an equally dusty atmosphere. Insofar as the gas burner generates a large quantity of heat, it cannot avoid the impingement of a correspondingly large volume of the dust-laden air. It can look for relief from this trouble, only in a reduction of the quantity of dust and dirt in the atmosphere, or by an increase in the efficiency of light production. In residences, especially those of the better class, in which this evil is more objectionable than elsewhere, there is reason to expect in the future a more dustless atmosphere, due to the introduction of a gaseous house-heating fuel, to the more general use of vacuum cleaners instead of brooms, and to cleaner city streets. In passing, it is worth noting that less dust in the air in residences, will have another beneficial effect on gas lighting, in that it will retard the accumulation on the burner gauzes, and thus lengthen the period between maintenance visits.

Ignition and Distance Control.

Second only to the handicap of discolored walls and ceilings, if indeed not of equal importance, are the problems of ignition and distance control. These have to do with the factor of convenience, an attribute of prime value. They are recognized as problems of fundamental importance, and there is no need for me to dwell on them in this place. Mechanical and chemical inventiveness have accomplished much in the efforts to solve them, and there is no reason to believe that the end has been reached.

An obstacle to the full development of gas lighting is a practice still followed generally by gas companies, which is based on a policy which the industry has drifted into, rather than consciously adopted. This is the practice by which the open-flame—the least efficient— burner is given away freely to consumers, while the various forms of the incandescent—the most efficient—burner are only sold at a profit. This practice places a handicap on the introduction of the incandescent burner, while obviously it is the true interest of the industry, in its competition with other forms of lighting, to facilitate the introduction of its most efficient appliances. It is not difficult to trace the path of this now mistaken policy. When all gas lighting was by the flat-flame burner, gas companies generally adopted the then liberal policy of giving these burners, without charge, to consumers. The expense was small, and the inducement to the consumer thus created was worth while. The replacement of the flat-flame by the incandescent burner has been a gradual process; the adherence to the candlepower standard has, as already explained, kept the flat-flame burner in an undeserved relative prominence; and the gas manager, as in all long established industries like the gas business, has been conservative. Thus this old practice has continued by virtue of its own momentum. Of course, there was less objection to it when gas lighting, even by the flat-flame burner, was less expensive than competing forms of lighting, but since this margin has grown smaller, or has disappeared, this practice has become increasingly unjustified. And yet it is generally followed today. Some progressive companies are now charging for flat-flame burners, and are shaping their new business policies so as to throw every inducement in the way of the consumer to use nothing but incandescent gas burners; and there is little doubt that gas companies generally will follow suit.

Standardization of Burners.

The subject just considered brings us naturally to another, which is matter for serious concern to gas lighting interests. The gas industry has not shown itself able to control the quality of its incandescent lighting appliances.

Inefficient, poorly designed and constructed burners, and flash mantles, constitute a very serious evil. And yet it is only within a comparatively recent date that the industry may be said to have considered it seriously. The national societies are now wrestling with the problem of standard designs and specifications of burners and mantles. So far, within my knowledge, no gas company has thought it worth while, in order to control this situation, to make free installations of standard burners, or even of standard mantles. In time, competition may bring them to it. Some companies, however, are using all of their influence to reduce, or altogether to stop, the sale of cheap burners and mantles by storekeepers in their cities, and to encourage their consumers to purchase all of their supplies from the companies. The fact that gas mantles, of a kind, may be made by relatively unskilled labor, and in a plant requiring so small a capital investment, is a detriment to the cause of gas lighting.

Still another question of mistaken policy, inherited rather than adopted, comes to mind. It has to do with the relations between gas companies on the one hand, and plumbers and gas fitters on the other. In order to facilitate and promote the introduction of gas cooking and other fuel appliances, gas companies generally have long followed the practice of including the connection with the sale of the appliance, and of installing the piping connection by their own workmen. Again, while many gas companies have refrained from installing in new houses at the time of their erection, the complete piping system for gas lighting, leaving this work to the plumbers, still, even in the lighting field, the desire to promote installations has led many gas companies to include in the sale of burners, any piping that may be needed to hang the burners. This piping work done by the companies, has, as a rule, cost the consumers less than the plumbers can afford to do it for. This practice has resulted in the plumbers and gas-fitters feeling that the gas company underbids them, and injures their market. Instead of every gas-fitter in town being a friend to the gas company and a promotor of gas lighting, as he should be, too often he is indifferent, or actively unfriendly. Within a recent period, the unwisdom of this situation has been appreciated, and at least one of the larger companies, within my knowledge, has adopted a policy the reverse of the traditional one.

Better Engineering Needed.

Generally poor illuminating engineering on the part of the gas company's salesmen may be fairly cited as one of the handicaps to which gas lighting is subjected. Many causes contribute—the salesmen are paid by a method which induces them to increase their sales at any cost, or by a method which induces them to select for sale, not the burners which are best for the location, but those which return the best pay to themselves, or campaigns are undertaken, in which only one type of burner is offered, or the salesmen are insufficiently instructed in the principles and practices of illuminating engineering, or to practice illuminating engineering would require a more careful study of the conditions than the salesmen have time for. I am offering no criticism of these causes, as many of them are unavoidable, or at times a given practice is advisable in spite of certain objections to it. It may, however, safely be said that these conditions tend to improvement. Salesmen generally are receiving more thorough instruction in illuminating engineering; they are as a class better experienced in its practice. One of the national societies has inaugurated an excellent course of instruction for them in this subject. Gas managers, largely through the influence of our own society, are more keenly alive to its importance.

During recent years there has grown a conviction in the industry, that gas companies should inaugurate systems by which their employees would visit consumers' premises to examine and maintain their gas lighting appliances. Some systems of this nature are in operation at the present time. As a description of these is the subject of a paper to be presented before this convention, I shall make no further comment except to say that the growth of a sentiment favorable to maintenance systems is a hopeful sign.

Gas Street Lighting.

It may seem grotesque to include the backwardness of the gas industry in promoting street lighting by gas as constituting in any sense a handicap. Yet I think it is worthy of a brief consideration here, as it marks a failure properly to utilize an effective means to publicity. Publicity! Of which gas lighting stands in so much need! Any article appealing to universal popular favor, no matter how excellent in itself, cannot hope to achieve its greatest success minus this indispensable ingredient. Such is the nature of our public; it pays to advertise. And how better can the gas industry advertise its lighting product than by effective, showy street lighting? Ornamental lighting by gas, appropriate for parkways, boulevards, and the show places of cities, is entirely feasible, and if it is undertaken by gas companies as an advertisement and means to publicity, and not as a means of making money, there is reason to believe that much of it may be secured. So long as there is slight or no demand, it is natural that but few properly artistic fixtures should be available.

A condition that, in one way or another, has had a retarding effect on the progress of the gas lighting business may be expressed in the word "rates." Long accustomed to sell their product at a rate that was uniform under all conditions of use, gas men are at this day only novices at the difficult and delicate art of rate making. While differential rates for gas are of more importance to the industry in the fuel end of its business, still its slowness in utilizing this efficient means of increasing sales, and reducing costs, has undoubtedly had a retarding effect on the progress of the lighting end. A realization of this fact is spreading rapidly.

I have reserved for the last, the most serious obstacle that threatens gas lighting today. As might be expected, it is an internal enemy, not one that menaces from without. It is indifference. Is the effort to promote gas lighting, to extend it in the face of active competition, especially in view of the splendid prospects of the fuel end of the business, after all, worth while? For one cause or another, this paralyzing doubt is but too common among gas men. In the face of it, how can the gas lighting business expect to progress? Circumstanced as it is, nothing but positive, vigorous enthusiastic effort, exerted by men who really believe in it and are determined to make a success of it, can maintain its standing, and secure its healthy growth.

A potent cause for the unfortunate condition I am now considering, is what is known as the "combination town," where the electric and gas undertakings are controlled in one interest. I feel tempted to say that the combination town is the worst enemy that gas lighting has. In the various combination towns, as they exist in different parts of the country, one of three different policies seems to control. (1) *Either the combination company does not actively push either its gas or its electric business, on the ground that having only a limited sum to devote to canvassing, it pays best to spend this sum respectively on the fuel and power ends of its two lines, because no matter what kind of light the consumer may want, "we get it anyhow."* (2) *Or the company frankly pushes the sale of the electric light alone, alleging that a given sum spent in canvassing in the gas field yields a far larger return in the fuel, than it does in the lighting end of the business.* (3) *Or finally, the company actually pushes both its electric and gas lighting, sending its canvassers out in competition, as though the two were operated separately. There can be little question as to which of these courses is the best from the viewpoint of the most extensive growth*

of artificial illumination. It is the demoralizing effect on the gas men operating under the first two conditions, and the enervating influence exerted by these men on their fellows in the business, which are deplored. Here are gas men, belonging to gas associations, and attending gas conventions, who frankly have no interest in gas lighting, or who are completely indifferent as to whether their consumers use the gas light or the electric light! Is it any wonder that indifference has reared its ugly head amongst us? When two natural competitors cease to compete, the general cause they both serve is bound to suffer.

But enough! Our catalogue of the ills under which modern gas lighting suffers is ended. It must needs be a robust child to bear up under so formidable an array of troubles. It *is* a child of sound constitution and tenacious vitality. Many of its infantile diseases have been weathered; some of the obstacles in its path are gradually becoming less formidable; some of the causes that have stunted its growth are in process of abatement. Conscious that it is doomed to maintain a life of struggle and competition, it still faces the future with a smile on its face, and with high hope in its heart. Let us, who have at heart the welfare and growth of artificial illumination, leave with it our best wishes.

MODERNIZE FIXTURES.

New Lamps Make It Possible To Secure Immense Business From This Source.

The introduction of the C. E-Z. burner and the campaigns of education incidental to its introduction have been responsible for a change from inverted to upright fixtures. This tendency has made it possible to modernize beautiful old fixtures by equipping them with up-to-date gas lighting burners. Two things are essential to a satisfactory installation — adequate illumination and the insurance of eye comfort. The photograph shown is a corner of the living room in the home of Col. G. G. Green, one of New Jersey's millionaires. The lighting throughout is by gas. The fixture illustrated is a beautiful French bronze affair originally costing over $400 and recently modernized by equipping it with five Welsbach C. E-Z. lights, No. 707 globe holders and No. 847 shades. This equipment completely harmonizes with the fixture and the surrounding house furnishings. The bracket light over the reading table has the same equipment as the central fixture. The cozy effect which makes one room appeal to us more than another is the fact that the lighting source is well screened and wall brackets for comfortable reading have been thoughtfully provided.

In every gas community there are thousands of old fixtures awaiting the activity and interest of the gas man to fortable reading have been provided.

TEXAS MEETING.

Directors Arrange for Second Annual Convention of Association in October.

At a meeting of the board of directors of the Texas Gas Association held in Dallas the 17th inst., final arrangements were completed for the second annual convention, which will be held at the Adolphus Hotel, Dallas, Oct. 16th and 17th. A very interesting program has been prepared, consisting of papers by various members, and the fact that subject bearing on the present industrial situation are to be discussed, has aroused considerable interest amongst the fraternity. A canvass of the membership indicates a large attendance. The committee on entertainment has arranged for a banquet and theatre party following the business sessions, as well as a visit to the Texas State fair, which will be in progress at that time.

Interior of Home of One of New Jersey's Millionaires, Showing Valuable Old Fixture Equipped with Modern Gas Lights.

Maintenance of Gas Lights

Systems Used for Residences Discussed in Paper Prepared for Illuminating Engineering Society—Plans Now in Operation Outlined

By E. B. Myers

For some time the majority of the gas companies throughout the country have had in effect well organized systems for the maintenance of gas lamps in commercial establishments. These gas lamps under maintenance have given better service than those not under maintenance. How much good is accomplished by systematic maintenance has been clearly shown by a recent lengthy and thorough investigation made by the National Bureau of Standards. This investigation was extended over ten large cities in this country, and consisted in the examination of thousands of gas lamps in commercial establishments, some of which were under maintenance and some of which were not.

This investigation emphasized the common troubles which might be expected to be found with gas lamps not under maintenance, and brought out clearly how proper maintenance had been effective in keeping other gas lamps in good condition. The following table gives an idea of the approximate relative rating which was given the performance of maintained gas lamps, as distinguished from the performance of unmaintained gas lamps:

Complaints	Rating: Not under Maintenance ("A")	Rating: Under Maintenance ("B")	Rating: Ratio of "B" to "A" ("C")
Mantles cracked or with holes	29	100	3½
Mantles carboned or dirty	33	100	3
Glassware cracked or broken	14	100	7
Glassware dirty	10	100	10
Pilots out	18	100	5½
Pilots improperly placed	22	100	4½
Pilots improperly adjusted	29	100	3½
Ceiling discolored	66	100	1½
Average	18	100	5½

It is assumed by the writer, for the sake of comparison, that the maintained lamps have a rating of 100, as shown by column "B." The corresponding rating of lamps not under maintenance is shown in column "A." Column "C" shows the ratio of rating "B" to rating "A." Thus, in the case of dirty glassware, the maintained lamps were given a rating with a value ten times the value of the lamps not under maintenance. This rating was given because, during the investigation an examination of an equal number of maintained and unmaintained lamps showed that ten lamps had dirty glassware on lamps not maintained to one lamp having dirty glassware on maintained lamps. When taking into consideration all these factors, such as mantle defects, glassware defects, pilot defects, etc., lamps under maintenance were given a rating having a value five and one-half times the value of the rating given the lamps not under maintenance. This, we believe to be no exaggeration, and we consider it a significant fact.

One System Commonly Used.

A variety of schemes has been tried by the different gas companies in maintaining gas lighting equipments in commercial establishments. These systems have met with varied success, but naturally those meeting with the least success have been eliminated until now there seems to be one system generally used for this work. Customers may receive the service by signing a contract card which calls for maintaining the lamps in good condition, including cleaning glassware, making the necessary adjustments, and supplying all repair parts, such as mantles, glassware, etc. It has been found by experience that calls made about every ten days are sufficient to keep the lamps in good condition, but, of course, additional calls are made where the case demands it. The work is handled by a corps of men under the direct charge of inspectors. These men are primarily expert lamp men and are in no sense, nor do they act as, salesmen. They carry with them a sufficient supply of mantles, repair parts, etc., in addition to the necessary cleaning materials. The charges made for this maintenance depend upon the type of lamp and vary with the number of mantles per lamp.

The beneficial results obtained by the systematic maintenance of gas lamps in commercial establishments appealed so strongly to some gas companies that maintenance of some sort has been extended to cover the lamps in residences, and the results have been no less gratifying. It is but natural that schemes for the maintenance of residence lamps installed in different cities, while having the same object in view, should be worked out along different lines.

"Request Maintenance."

The earliest attempt to pay special attention to the maintenance of illuminating appliances in the home was simply to extend somewhat the scope of the complaint work already being done by the distribution department of the gas company. This resulted in what is called "request maintenance." By making the request to the gas company, any consumer could have a man call who would make any or all necessary lamp adjustments free of charge. If any material, such as globes, mantles, or lamp parts, was necessary, it was charged at regular prices. In other words, upon request, labor was supplied free of charge, the only cost to the consumer being for material.

It was soon found, however, that lamps in residences were in little better shape than before. The average customer would not avail himself of "request maintenance." He would probably first endure, and then become accustomed to, poor lighting conditions rather than immediately make the request upon the gas company. It was realized before long that, to make the maintenance scheme effective, it was necessary to take the matter out of the hands of the customer, and to have the inspection, adjustment, or repairs made regularly and automatically.

Toronto Plan.

Probably the earliest attempt to put into effect such an automatic system was made at Toronto, Canada, and it has therefore been called the Toronto plan. In this plan, the gas company makes a house to house canvass of the

city, so that each home is reached three times a year. By this means, every gas lamp in every residence is examined and adjusted, and the glassware cleaned. There is no charge to the customer for this work. Should it be necessary to replace broken mantles, broken glassware, or other lamp parts, this work is done then and there by the inspector, who carries a stock of replacements in a well-equipped kit These articles are supplied and installed at regular prices, there being no charge for the labor.

These inspectors are experienced men, carefully selected for their work. They are familiar with the disadvantages incidental to the use of antiquated, cheap or inefficient lamps, and are able to make suggestions resulting in the betterment of the illumination and often, at the same time, decreasing the operating cost. For example, a customer is advised to replace open flame burners with modern incandescent gas lamps. Where modern lamps are so placed that the illumination is improperly applied, changes are suggested which result in the proper application. Suggestions are made leading to the installation of proper shades or globes tending to reduce otherwise high intrinsic brilliancy, with the elimination of glare.

Where, for any reason the illuminaton has decreased gradually, the householder might not become aware of this condition because of the gradualness of the change. Morever, should one of several gas lamps become inoperative where all are necessary for adequate illumination, the condition might be endured because of lack of initiative on the part of the householder. When the inspector brings these points to his attention, these conditions are often remedied.

The object of these regular maintenance systems is to anticipate complaints on gas lighting equipment, and thus insure to the customers continued proper illumination throughout the house. Moreover, these results can be obtained at no relatively high expense. It has been found that in operating the Toronto scheme, the profit made on the sale of new lamps, lamp parts, or mantles, by the inspector considerably reduces the cost to the gas company. This cost is further decreased if there is taken into consideration the fact that complaint work is often attended to by the inspector on the job which would otherwise have to be attended to by another gas company employee sent on a special visit. Then, too, when the maintenance system is in operation, the cost of ordinary complaint work (ordinarily done free by gas companies) on incandescent lamps is considerably lower than would be the case if the maintenance system were not in force. Numerous gas companies have adopted this Toronto plan, or similar plans with slight variations. Equally good results have been obtained, and it is claimed that visits made three times each year are sufficient to keep the lighting equipments in the best of condition.

The Chicago Plan.

In some localities, it has been thought well to put into effect a somewhat different plan, called the Chicago plan, so called because of its origination in that city. It is a selective plan. Those customers who signify their desire for this service sign a contract by which lamps are maintained at the rate of ten cents per lamp per month. Each lamp on maintenance is visited once per month, and is therefore kept in perfect condition. New mantles, lamp parts, or glassware, are supplied at no further expense to the customer. The advocates of this plan are enthusiastic over the results obtained, but it has the disadvantage that all lighting equipments throughout the city are not visited regularly, as in the case of the Toronto plan. In one city using a scheme similar to the Chicago plan, this disadvantage has been recognized and they have installed an additional maintenance scheme by means of which a house to house canvass is made each fall and every gas lighting equipment in the city is put in perfect condition, the customer being charged only for the material used.

Maintenance for All Lamps.

Gas companies have long been of the opinion, and now the investigations of the Bureau of Standards have proved the fact, that gas lighting equipments maintained by the customer are not maintained at all. We emphasize a statement made by the Bureau of Standards, contained as one of the conclusions in their report: "When one recognizes the great advantages of maintenance to both company and customer, it seems that it would be desirable to have this service rendered to all users of gas for lighting."

A canvass of the gas companies of this country which has just been completed shows that more and more interest is being given by them to this subject of the maintenance of gas lighting equipment in the home. In fact, in a large number of cities, residential maintenance systems are now being operated and in many other cities such systems are in the process of being worked out. Those companies having experience with these maintenance systems are enthusiastic over the results obtained and it is hoped that all gas companies will take steps to keep gas lighting equipments in the home in good condition by the prompt installation of systematic maintenance schemes.

Denver's Daily Gas Sales Exceed 5,000,000 Cubic Feet.

The gas production of the Denver Gas & Electric Light Co. on August 14 reached the highest figure which it has ever attained—5,064,900 cubic feet. The passing of the 5,000,000 mark means that the Denver company has increased its output per day from 750,000 in 1902 to its present figure—an increase of about 700 per cent.

This large figure, however, is not duplicated every day, but is usually somewhat under that mark. In fact, the production of August 14 was the second time in a month that the Denver records were broken, as a few days earlier the production equalled 4,896,000 cubic feet. Clare N. Stannard, secretary of the Denver Gas & Electric Light Co., who reports these figures, says that the record-breaking day represented an increased consumption over the previous day of 133,000 cubic feet, or 20 per cent.

Successful Room Heater and Water Heater Campaigns.

Gas heaters are to be the object of a strong selling campaign by the Public Service Co. of Northern Illinois, starting earlier than the usual date selected every autumn. It is considered that the many factors in the coal situation will direct more than ordinary attention to these appliances. It is intended to exploit several types, all of them highly efficient and attractive in appearance. Hot water heaters, the same company reports, continue to move out, mostly those of the tank type. But sales of automatic heaters have been so far this year, in excess of the figures of 1916. The campaign carried on in Ottawa, Ill., in June was successful. Though as usual in moves of this character there was a special effort concentrated within the limit of a week, the effects of it continued to be manifest after the week expired. The magnitude of the field for water heaters has been referred to before. Study of it, says "Lumen," the company's journal, indicates that it constitutes one of the most important of the service opportunities throughout the territory.

Henrico County Co. Has Big Hot Water Week.

G. W. Rhodes, superintendent of the Henrico County Gas Co., Richmond, Va., conducted a successful campaign during Hot Water Week. A direct mail campaign featuring the new No. 65 "Pittsburgh Bungalow," three-gallon-per-minute heater, was put on, and the popular line of Pittsburgh heaters displayed in the gas company show room. Working hand in hand with the sales promotion department of the Pittsburg Water Heater Co., Mr. Rhodes secured a better percentage of sales to prospects than any other company in Virginia during Hot Water Week.

Lighting Nomenclature

Committee of Illuminating Engineering Society Submits 1917 Report on Standards for Illumination—Many Definitions Have Been Revised

The committee on nomenclature and standards during the past year has systematized its work to a greater degree than heretofore and has made more extensive use of the reports of sub-committees as a basis for discussion. The number of new definitions which it has to present is not large, but much time and effort have been given to a satisfactory revision of some of the more fundamental of the old definitions, and through sub-committees a number of important proposals are being framed which were not ready for consideration before the close of the year. It is believed that certain of the definitions as given in the 1916 report have been materially improved as a result of the extended consideration which has been given to them. The definitions which have received unusually careful consideration during the year, and which in some case represent revisions of the old definitions, are indicated in the report by the prefix "R." New definitions are indicated by the prefix "N." Where the prefix "NR" occurs it indicates that the definition is a new one which has been given unusually careful consideration. The members of the Society are invited to submit criticisms and discussions of the definitions which the report contains and to suggest matters which in their opinion might profitably be considered by the committee.

NR 1. Light.—The term light is used in various ways: (1) To express the visual sensation produced normally when radiant flux (*i. e.*, within the proper limits of wave length, of sufficient intensity and of sufficient duration) impinges on the retina. (2) To express the luminous flux (*q. v.*) which produces the visual sensation. (3) By extension, even to express the radiant flux of any wave-length throughout the entire spectrum (*e. g.*, ultra-violet light).

NR 2. Radiant flux, ϕ, is the rate of flow of radiation evaluated with reference to energy, and is expressed in ergs per second or in watts.

R 3. Luminous flux, F, is the rate of flow of radiation evaluated with reference to visual sensation, and is expressed in lumens.

R 4. Visibility, V_λ, of radiation of a particular wave-length is the ratio of the luminous flux at that wave-length to the corresponding radiant flux.

Defining equation

$$V_\lambda = \frac{F_\lambda}{\phi_\lambda}$$

NR 5. The Mechanical equivalent of light is the ratio of radiant flux to luminous flux for the wave length of maximum visibility, and is expressed in ergs per second per lumen, or in watts per lumen. It is the reciprocal of the maximum visibility. This term has been used in a variety of senses. As here defined it refers only to the minimum mechanical equivalent of light. The reciprocal of this quantity is sometimes called the luminous equivalent of radiation.

NR 6. Luminosity of a particular wave-length is the product of the visibility of that wave-length and the corresponding ordinate of the spectral curve of radiant flux, and is represented by the ordinate of the spectral curve of luminous flux. This curve is called the spectral luminosity curve and is different with different sources.

NR 7. The Luminous efficiency of any source is the ratio of the luminous flux to the radiant flux from the source and is expressed in lumens per watt.

NR 8. Lamp efficiency is the ratio of the luminous flux output to the power input.

R 9. Luminous intensity, I, of a source of light in a given direction is the solid angular density of the luminous flux emitted by the source in the direction considered, when the flux involved lies as far as computation and measurements are concerned, as if it came from a point. Or, it is the flux per unit solid angle from that source in the direction considered. The flux from any source of dimensions which are negligibly small by comparison with the distance at which it is observed, may be treated as if it were emitted from a point.

Defining equation

$$I = \frac{dF}{d\omega}$$

or, if the intensity is uniform,

$$I = \frac{F}{\omega}$$

where ω is the solid angle.

R 10. Illumination, E, of a surface at any point is the luminous flux density on the surface at that point, or the flux per unit of intercepting area.

Defining equation:

$$E = \frac{dF}{dS}$$

or, when uniform,

$$E = \frac{F}{S}$$

where S is the area of the intercepting surface.

R 11. Candle—the unit of luminous intensity maintained by the national laboratories of France, Great Britain and the United States. (This unit, which is used also by many other countries, has frequently been referred to as the international candle.)

R 12. Candlepower—luminous intensity expressed in candles.

R 13. Lumen—the unit of luminous flux equal to the flux emitted in a unit solid angle (steradian) by a point source of unit candlepower. (A uniform source of one candlepower emits 4π lumens.)

R 14. Lux—a unit of illumination equal to one lumen per square meter. Using the centimeter as the unit of length, the unit of illumination is one lumen per square centimeter, for which Blondel has proposed the name "phot." One millilumen per square centimeter (millephot) is more useful as a practical unit. One foot-candle is one lumen per square foot and is equal to 10.764 millephots. The millephot is recommended for scientific records.

R 15. Exposure—the product of an illumination by the time. The micro-phot-second (0.000 001 phot-second) is a convenient unit for a photographic plate exposure.

R 16. Specific luminous radiation, E′—the luminous flux-density emitted by a surface, or the flux emitted per unit of emissive area. It is expressed in lumens per square centimeter.

Defining equation:

$$E' = \frac{dF}{dS}$$

or, when uniform,

$$E' = \frac{F}{S}$$

R 17. Brightness, b, of an element of a luminous surface from a given position, may be expressed in terms of the luminous intensity per unit area of the surface projected on a plane perpendicular to the line of sight, and including only

a surface of dimensions negligibly small in comparison with the distance at which it is observed. It is measured in candles per square centimeter of the projected area.

Defining equation:

$$b = \frac{dI}{dS \cos \theta}$$

where θ is the angle between the normal to the surface and the line of sight.

R. 18. *Normal Brightness,* b_0, of an element of a surface (sometimes called specific luminous intensity) is the brightness taken in a direction normal to the surface. (In practice, the brightness b of a luminous surface or element thereof is observed and not the normal brightness b_0. For surfaces for which the cosine law of emission holds, the quantities b aand b_0 are equal.)

Defining equation:

$$b_0 = \frac{dI}{dS}$$

or, when uniform,

$$b_0 = \frac{I}{S}$$

For surfaces obeying Lambert's cosine law of emission,

$$E' = \pi b_0.$$

R 19. *Brightness* may also be expressed in terms of the specific luminous radiation of an ideal surface of perfect diffusing qualities, *i. e.*, one obeying Lambert's cosine law.

R 20. *Lambert*—a unit of brightness. The brightness of a perfectly diffusing surface radiating or reflecting one lumen per square centimeter. This is equivalent to a perfectly diffusing surface having a reflection factor equal to unity, and an illumination of one phot. For most purposes the millilambert, 0.001 lambert, is the preferable practical unit.

A perfectly diffusing surface emitting one lumen per square foot will have a brightness of 1.076 millilamberts.

Brightness expressed in candles per square centimeter may be reduced to lamberts by multiplying by $\pi = 314$.

Brightness expressed in candles per square inch may be reduced to lamberts by multiplying by $\pi/6.45 = 0.487$.

In practice, no surface obeys exactly Lambert's cosine law of emission; hence the brightness of a surface is not uniform in all directions, and consequently the brightness in lamberts is generally not numerically equal to the specific luminous radiation in lumens per square centimeter.

NR 21 *Quality of luminous flux* is that property of luminous flux determined by its spectral distribution.

NR 22. *Color of luminous flux* is the subjective evaluation by the eye of the quality of luminous flux. Any color can be expressed in terms of its hue and saturation.

NR 23. *Hue* is that property of color by which the various spectral regions are characteristically distinguished. All colors except purples and white may be matched in hue with spectral colors. In the case of a purple, the spectral hue which is complementary to the hue of the purple is ordinarily used for scientific designation.

NR 24. *Two hues* are complementary if they may be mixed to produce white. White may be considered as a color having no hue. By the mixture of luminous fluxes of two or more hues properly chosen both as to hue and intensity, a resultant luminous flux may be obtained which has the color white. Whenever luminous fluxes of two or more hues are mixed, the resultant luminous flux, though it may have some dominant hue, will ordinarily be evaluated subjectively as having an admixture of white.

NR 25. *Saturation of a color* is its degree of freedom from admixture with white. Monochromatic spectral light may, for purposes of measurement, be considered as having a saturation of 100 per cent. As white light is added, the saturation decreases, until, when the hue entirely disappears, the saturation is zero White, therefore, is the limiting color, having no hue and zero saturation.

R 26. *Reflection factor*[5] of a body, ρ, is the ratio of the flux reflected by the the body to the flux incident upon it. The reflection from a body may be regular, diffuse or mixed. In regular reflection the flux is reflected at an angle of reflection equal to the angle of incidence. In diffuse reflection the flux is reflected in all directions. In perfectly diffuse reflection, the distribution of the reflected flux is in accordance with Lambert's cosine law. In most practical cases, there is a superposition of regular and diffuse reflection.

R 27. *Regular reflection factor* of a body is the ratio of the regularly reflected flux to the incident flux.

R 28. *Diffuse reflection factor* of a body is the ratio of the diffusely reflected flux to the incident flux.

R 29. *Absorption factor*[5] of a body, α, is the ratio of the flux absorbed by the body to the flux incident upon it.

R 30. *Transmission factor*[5] of a body, τ, is the ratio of the flux transmitted by the body to the flux incident upon it.

$$\rho + \alpha + \tau = I$$

N 31. *Coefficient of utilization* of an illumination installation on a given plane, is the total flux received by that plane divided by the total flux from the lamps illuminating it. When not otherwise specified, the plane of reference is assumed to be a horizontal plane 30 inches (76 cm.) from the floor.

N 32. *Variation factor* of an illumination installation is the ratio of either the maximum or minimum illumination on a given plane to the average illumination on that plane.

N 33. *Variation range* of illumination on a given plane is the ratio of the maximum illumination to the minimum illumination on that plane.

N 34. *Hemispherical ratio* for a given lighting unit is the ratio of the luminous flux in the upper hemisphere to that in the lower hemisphere.

N 35. *Brightness ratio* is the ratio of the brightness of any two surfaces. When the two surfaces are opposed, the brightness ratio is commonly called the "brightness contrast."

36. *Lamp*—a generic term for an artificial source of light.

37. *Primary luminous standard*—a recognized standard luminous source reproducible from specifications.

38. *Representative luminous standard*—a standard of luminous intensity adopted as the authoritative custodian of the accepted value of the unit.

39. *Reference standard*—a standard calibrated in terms of the unit from either a primary or representative standard and used for the calibration of working standards.

40. *Working standard*—any standardized luminous source for daily use in photometry.

41. *Comparison lamp*—a lamp of constant but not necessarily known candlepower against which a working standard and test lamps are successively compared in photometer.

42. *Test lamp,* in a photometer—a lamp to be tested.

43. *Performance curve*—a curve representing the behavior of a lamp in any particular (candlepower, consumption, etc.) at different periods during its life.

44. *Characteristic curve*—a curve expressing a relation between two variable properties of a luminous source, as candlepower and volts, candlepower and rate of fuel consumption, etc.

45. *Horizontal distribution curve*—a polar curve representing the luminous intensity of a lamp, or lighting unit, in a plane perpendicular to the axis of the unit, and with the unit at the origin.

46. *Vertical distribution curve*—a polar curve representing the luminous intensity of a lamp, or lighting unit, in a plane passing through the axis of the unit and with the unit at the origin. Unless otherwise specified, a vertical distribution curve is assumed to be an average vertical distribution curve, such as may in many cases be obtained by rotating the unit about its axis, and measuring the average intensities at the different elevations. It is

[5]These terms are introduced to replace the more commonly used terms, Coefficient of reflection, Coefficient of absorption, Coefficient of transmission, which latter terms refer to the specific properties of materials rather than to the behavior of bodies under specified conditions, such as angle of incidence, etc.

recommended that in vertical distribution curves, angles of elevation shall be counted positively from the nadir as zero, to the zenith as 180°. In the case of incandescent lamps, it is assumed that the vertical distribution curve is taken with the tip downward.

47. *Mean horizontal candlepower* of a lamp—the average candlepower in the horizontal plane passing through the luminous center of the lamp.

It is here assumed that the lamp (or other light source) is mounted in the usual manner, or, as in the case of an incandescent lamp, with its axis of symmetry vertical.

48. *Mean spherical candlepower* of a lamp—the average candlepower of a lamp in all directions in space. It is equal to the total luminous flux of the lamp in lumens divided by 4π.

49. *Mean hemispherical candlepower* of a lamp (upper or lower)—the average candlepower of a lamp in the hemisphere considered. It is equal to the total luminous flux emitted by the lamp in that hemisphere divided by 2π.

50. *Mean zonal candlepower* of a lamp—the average candlepower of a lamp over the given zone. It is equal to the total luminous flux emitted by the lamp in that zone divided by the solid angle of the zone.

51. *Spherical reduction factor* of a lamp—the ratio of the mean spherical to the mean horizontal candlepower of the lamp. In the case of a uniform point source, this factor would be unity, and for a straight cylindrical filament obeying the cosine law it would be $\pi/4$.

52. *Photometric tests* in which the results are stated in candlepower should be made at such a distance from the source of light that the latter may be regarded as practically a point. Where tests are made in the measurement of lamps with reflectors, or other accessories at distances such that the inverse square law does not apply, the results should always be given as "apparent candlepower" at the distance employed, which distance should always be specifically stated.

53. *The output* of all illuminants should be expressed in lumens.

54. *Illuminants should be rated* upon a lumen basis instead of a candlepower basis.

55. *The specific output of electric lamps* should be stated in terms of lumens per watt and the specific output of illuminants depending upon combustion should be stated in lumens per British thermal unit per hour. See paragraph 8.

When auxiliary devices are necessarily employed in circuit with a lamp, the input should be taken to include both that in the lamp and that in the auxiliary devices. For example, the watts lost in the ballast resistance of an arc lamp are properly chargeable to the lamp.

56. *The specific consumption* of an electric lamp is its watt consumption per lumen. "Watts per candle" is a term used commercially in connection with electric incandescent lamps, and denotes watts per mean horizontal candle.

57. *Life Tests*—Electric incandescent lamps of a given type may be assumed to operate under comparable conditions only when their lumens per watt consumed are the same. Life test results, in order to be compared, must be either conducted under, or reduced to, comparable conditions of operation.

58. *In comparing different luminous sources,* not only should their candlepower be compared, but also their relative form, brightness, distribution of illumination and character of light.

59. *Lamp Accessories.—A reflector* is an appliance the chief use of which is to redirect the luminous flux of a lamp in a desired direction or directions.

60. *A shade* is an appliance the chief use of which is to diminish or to interrupt the flux of a lamp in certain directions where such flux is not desirable. The function of a shade is commonly combined with that of a reflector.

61. *A globe* is an enclosing appliance or diffusing material the chief use of which is either to protect the lamp or to diffuse its light.

Photometric Units and Abbreviations.

Photometric quantity	Name of unit	Symbols and equations	Abbreviation of unit
1. Luminous flux	Lumen	F, Ψ	l
2. Luminous intensity	Candle	$I = \frac{dF}{d\omega}, \Gamma = \frac{d\Psi}{d\omega}$	cp.
3. Illumination	Phot, foot-candle, lux	$E = \frac{dF}{dS} = \frac{I}{r^2}\cos\theta, \beta$	ph. fc.
4. Exposure	Phot-second; Micro phot-second	Et	phs. μphs.
5. Brightness	Apparent candle per sq. cm.; Apparent candle per sq. in.	$b = \frac{dI}{dS\cos\theta}$	—
	Lambert	$L = \frac{dF}{dS}$	—
6. Normal brightness	Candles per sq. cm.; Candles per sq. in.	$b_0 = \frac{dI}{dS}$	—
7. Specific luminous radiation	Lumens per sq. cm.; Lumens per sq. in.	$E' = \pi b_0, \beta'$	—
8. Reflection factor	—	$\rho = \frac{E'}{E}$	—
9. Absorption factor	—	α	—
10. Transmission factor	—	τ	
11. Mean spherical candlepower		scp.	
12. Mean lower hemispherical candlepower		lcp.	
13. Mean upper hemispherical candlepower		ucp.	
14. Mean zonal candlepower		zcp.	
15. Mean horizontal candlepower		mhc.	

16. 1 lumen is emitted by 0.07958 spherical candlepower.
17. 1 spherical candlepower emits 12.57 lumens.
18. 1 lux = 1 lumen incident per square meter = 0.0001 phot = 0.1 milliphot.
19. 1 phot = 1 lumen incident per square centimeter = 10,000 lux = 1,000 milliphots = 1,000,000 microphots.
20. 1 milliphot = 0.001 phot = 0.929 foot-candle.
21. 1 foot-candle = 1 lumen incident per square foot = 1.076 milliphots = 10.76 lux.
22. 1 lambert = 1 lumen emitted per square centimeter of a perfectly diffusing surface.
23. 1 millilambert = 0.001 lambert.
24. 1 lumen, emitted, per square foot* = 1.076 millilamberts.
25. 1 millilambert = 0.929 lumen, emitted, per square foot.*
26. 1 lambert = 0.3183 candle per square centimeter = 2.054 candles per square inch.
27. 1 candle per square centimeter = 3.1416 lamberts.
28. 1 candle per square inch = 0.487 lambert = 487 millilamberts.

* Perfect diffusion assumed.

Symbols.

In view of the fact that the symbols heretofore proposed by this committee conflict in some cases with symbols adopted for electric units by the International Electrotechnical Commission, it is proposed that where the possibility of any confusion exists in the use of electrical and photometrical symbols, an alternative system of symbols for photometrical quantities should be employed. These should be derived exclusively from the Greek alphabet, for instance:

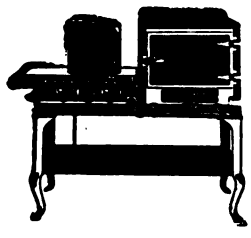
Luminous intensity	Γ
Luminous flux	Ψ
Illumination	β.

Byllesby & Co. Have Nineteen Men in the Service.

The contribution of H. M. Byllesby & Co. to the government in men includes one brigadier general, one captain, three first lieutenants, one second lieutenant, four unassigned officers in the officers' reserve camps, one wireless operator, five privates in the army, one chief yeoman and two yeomen in the navy.

Germans Forced To Reduce Gas Consumption.

The people of Apolda, a big town in southwestern Germany, have as a punishment for their extravagance in the use of fuel recently had their gas supply cut off for twenty-four hours. People whose gas bills do not show a seemly fall are threatened with having their gas meters removed altogether.



Help Hoover!

Gas companies certainly did arise nobly to the callfor food preservation. Your campaign must have made the food barons shiver at the prospect of scantier plucking this Winter.

There'e a moral in your success with the campaign. Pick an idea that has economy dominant and women will stampede toward your salesrooms.

The Chambers Fireless Gas Range

has won thousands of orders by its economy of labor—attention—food—fuel.

The CHAMBERS is one appliance in its class that has a consistent record of success.

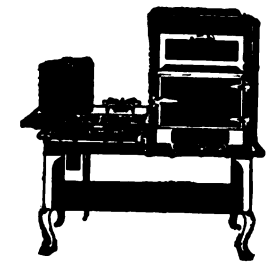
Every gas company will find that its most exhaustive and broad minded examinations will recommend the CHAMBERS for immediate adoption.

For the immediate needs of yourselves and your customers and for protection against future electric competition, get busy with the CHAMBERS right away.

Send for a sample range as the first step.

Chambers Mfg. Co.

Shelbyville, Ind.



On Salesmanship

G. P. Egleston, in Paper Before Pacific Association, Advocates System

In all large and successful industrial enterprises, said Mr. Egleston, the Sales Department is recognized as the heart of the business, the center that radiates life blood and enthusiasm to the entire company, the department that makes it possible for the company to reach out and expand. For this reason co-operation with the Sales Department by the other departments is known to be essential, and the harder the times the greater the responsibility placed upon this department and the more generous the support given. The Sales Department of a gas company is just as essential to its well-being, but mainly for the reason that tangible evidence of the achievements is somewhat difficult to determine, and because its operation has rarely been properly systematized, this department never has been placed upon a proper footing. Instead of working on a definite appropriation, based on the estimated increased revenue secured or desired, it has been regarded merely as an expense, justifiable in times of prosperity but an unwarranted burden during periods of depression. Anyone who will spend a little time in careful consideration of the subject will readily appreciate the fallacy of this attitude. As an example: Let us imagine for a moment a gas company with a total plant valuation of $250,000.00 on which interest and depreciation are figured at 12 per cent per annun. The monthly output of this company at the time under consideration is six million cubic feet, the total cost per thousand cubic feet being $1.166, made up as follows:

Production	.38
Transmission and distribution	.12
Commercial expenses	.10
General expenses and taxes	.15
Interest and depreciation on investment	.416
Total	$1.166

We will further imagine that the directors of this company, owing to the increasing cost of labor and material, find themselves apparently facing a situation in which the total cost is rapidly approaching the revenue. Two alternatives face them; the one usually accepted being retrenchment, with the immediate cutting down of the new business endeavors. The other one, that is not generally given proper consideration, is the extension of the previous sales policy in an endeavor to secure an additional consumption of gas. Let us assume that the latter policy has been followed and at the end of five years the output of the company has been doubled, this additional output necessitating a further capital expenditure of $100,000.00, making a total valuation upon which interest must now be paid of $350,000.00. It is certain that under ordinary circumstances this additional output would considerably reduce the actual cost of delivering gas to the holder, but, allowing for an increase in the cost of fuel, etc., we will assume that the cost of production per thousand remains the same. We will further assume that the total distribution, commercial, general expenses and taxes are increased 50 per cent but, owing to the additional output, the expense per thousand feet sold shows an actual reduction, and in place of a total cost per thousand cubic feet of $1.166 five years previously, we now have a total cost of only .947 made up as follows:

Production	.38
Transmission and distribution	.09
Commercial expense	.075
General expenses and taxes	.112
Interest and depreciation on investment	.29
Total	$ .947

These figures, though only approximate, are conservative and show clearly that the policy usually adopted of cutting down the sales department in periods of depression aggravates rather than relieves the condition. I suggest that an analysis along above lines would be to the interest of the executives of our companies before allowing a policy of retrenchment to affect the new business or any other department.

New Business Departments Should Have Systematic Appropriation.

The average sales department of a gas company usually is handicapped by the fact that no definite relation between the cost of production of new business and the revenue derived therefrom has ever been established. It is obvious that under ordinary circumstances the potential consumption of gas due to the installation of any appliance has some definite future value to the company, and that, except under very unusual circumstances, this value is the same whether in periods of prosperity or depression. On the other hand the work of the new business department is much harder during periods of business depression and at certain seasons of the year than at other times; it is therefore unfair to judge the sales manager's monthly report harshly, because during the dull season of the year his cost of securing one thousand cubic feet of additional consumption is greater than during the Spring and early Summer, and the net value of his efforts can only be judged by his average cost over a period of twelve months in comparison with the increased volume produced. Owing to the many factors which enter into a mathematical determination of the allowance which can be made for new business expenditure per thousand cubic feet estimated consumption, I will not endeavor to solve the question here but rather leave the problem to the statisticians of companies interested. However, I do go on record that some definite amount, based on estimated consumption, should be appropriated to the sales department for its maintenance. The cost to the insurance company of securing new policyholders is not less than the entire first year's premium. A gas company should spend on its sales department at least a large percentage of the revenue due to the estimated increased consumption secured by the departments during the year. A definite appropriation would stabilize sales departments, enable them to plan and execute their work in a definite manner, and bring about a more complete understanding between executives and sales managers.

Why All Gas Companies Should Sell Appliances.

The question as to whether companies should sell appliances is very definitely settled in writer's mind, all of his experience having been in the sales departments of companies whose policy was to sell appliances at a price which secured the co-operation of dealers insuring them a fair margin of profit. But this policy should not be allowed to interfere with any sale, periodical or otherwise, which the company may feel is justified to create the additional sale of gas.

The sale of appliances cannot be entrusted entirely to the dealer, as his volume of sales is not sufficient to allow him to employ house-to-house salesmen, an absolute necessity in every successful sales department. Further, his interest naturally ceases as soon as the immediate transaction is completed.

The sales of gas appliances by the gas company is less a question of merchandising than it is of service. The statements of the gas salesmen, the manner of installation, the adjustment of appliances, are all matters of vital interest to the gas company. To the dealer they are of secondary importance to the sale of the appliance and collection of his bill, and it seems to me that, though we all welcome the co-operation of the dealer, it is fatal to our ultimate interest to transfer to him our very real obligations at the commencement of our relations with a consumer.

Systematic Analysis of the Community Is Important.

The efficient sale of gas, as distinct from gas appliances, involves a careful study not only of the needs of the individual consumer, but of the community at large, and of the operating conditions of the company itself. It is obvious that the sale of a million cubic feet of gas per annum, involving a capital expenditure of $100.00 is more valuable to the company than the sale of the same amount of gas with a capital expenditure of $500.00, therefore, new business which requires neither main extensions nor additional plant capacity is the most valuable to the company. The sales manager should be thoroughly acquainted with the location of the districts served by mains which are run to least capacity and that he also should know the peak hours of the day and the peak months of the year in order that he may center his attentions on improving the load factor, thus tending to more efficiently utilize the generating and distribution equipment. Information such as this can only be secured by close co-operation between the operating, distribution

and sales departments. A salesman working along systematic lines, knowing those of the community who have or have not such and such an appliance, can utilize his time fully fifty per cent. more efficiently than the salesman who is obliged to canvass blindly a number of houses, 80 per cent. of which may be already equipped with the particular appliance he is endeavoring to sell. To assist the salesman in gathering this data, special forms of house record cards should be provided, these cards not only showing the present appliances installed but further equipment for which they may become a prospect, together with a suggested date for a re-call. The cards should be in duplicate, one set being filed in the office under street and number, the other being used by the salesman and filed in month and day file for re-call.

To most efficiently utilize salesmen some systematic method of working has been found absolutely necessary. A certain number of calls are laid out for him on each of which he has some definite information. For instance, during Water Heater Week each man has before him, correctly routed, a list of every house in his district not yet provided with one of these appliances. He, therefore, can work intensely on this campaign throughout the week without ringing a single unnecessary door-bell, avoiding waste of time and annoyance to consumers. Having regard to the great opportunities of heating by gas, these cards also record the type of house heating appliance at present in use, together with the fuel used. This enables any salesman to work on house heating after the regular range and water heater season is over and be practically in a position before he rings the bell to recommend the type of gas heating installation which will meet the prospect's requirements and pocketbook. For instance, if a small bungalow of three rooms is heated with coal stoves, it is possible that some kind of vented radiator can be cheaply and satisfactorily installed. If, on the other hand, a large house is heated by a system of hot water radiators, the prospect would be most likely to consider either a gas-fired hot water boiler, or some system using concealed piping only.

The Importance of Concentrated Special Campaigns.

The policy of increasing sales by offering some special inducement from time to time is one that is almost generally adopted in every branch of merchandising, and there is no doubt that such sales or inducements have a psychological value quite out of proportion to their cost, but such sales or inducements depend entirely for their value upon the manner in which they are presented and the selection of a proper season. Examples of the type of inducement which will be in everybody's mind are the Gas Range and Water Heater weeks of the National Commercial Gas Association These sales owe their effectiveness to the fact that during one week the gas companies throughout the country force the thought of a gas range or a gas water heater, into the mind of every housewife, with, as a rule, the additional inducement of a reduction in price. The effect of this is to bring to the culminating point at the right moment the persistent efforts of the sales department during the previous months and unless some such special effort were made it is possible that much of this work would be lost because the interest of the housewife was never excited to the right pitch. A Gas Range Week without the steady effort of the salesman throughout the winter would lose 80 per cent. of its effectiveness and this should be realized when the results of any such special sale are discussed.

Other Campaign Features Which Can Be Successfully Used.

Special sale weeks are not, however, by any means the only inducement that can be made to a prospective consumer. In fact, it may well be doubted if they are even the most valuable. For instance, we know of hundreds of gas ranges in every community which stand beside wood or coal ranges, and are used only during the summer months. **It is certain, therefore, that any inducement that can be made to a consumer to entirely replace her wood or coal range with a gas range nearly doubles the effectiveness and value of the latter appliance.**

The most usual inducement to fulfill this purpose is to make some allowance either in cash or as a discount on the purchase price of gas appliances for the wood range which is removed from the premises, and generally scrapped. This policy, however, does not make it obligatory upon the consumer to purchase a kitchen heater. The consequence is in many cases that when winter comes need of heat in the kitchen is felt and some small wood range with oven is purchased and no object has been achieved by making the allowance. A more desirable method would appear to be the free exchange of a kitchen heater for a wood or coal stove to every consumer purchasing a cabinet gas range. When this is done, it is most unlikely that the consumer would even consider reversion to the old type of appliance.

The value of the demonstrator as part of the service organization is already recognized by most gas companies, but few take advantage of her potential capacity for indirectly inducing sales. One company's demonstrator calls upon the consumer immediately after the range is set, sees that the range is properly adjusted and the consumer understands in general the operation of the range. She then informs the consumer that she would be glad to give a practical demonstration of the operation of the range by preparing and cooking an entire meal, including some novel dishes. She, however, explains that as her time is valuable to the company by which she is employed, it insists that at least six of her neighbors—preferably non-gas users—be present to witness the demonstration. At that time, the demonstrator not only cooks the meal as promised, but explains fully the advantage of gas over any other form of fuel, also giving the consumer a practical lesson in the reading of the gas meter and the small cost of cooking with gas by reading the meter before and after the meal is cooked. This method has proved such a pronounced success that it is proposed to develop a series of community demonstrations in private homes, clubs and churches on the same plan.

Advantages of Good Gas Company Advertising.

That the sales power of the press is amenable to scientific treatment has been abundantly proven in the results achieved by advertising today as compared with those of even twenty years ago. Today many firms of national reputation willingly admit that by far the greater part of their revenue is the result of—is, indeed, directly traceable to—their investment in varied forms of publicity. If, therefore, newspaper and other publicity is a paying proposition with the manufacturer, whose product is more or less liable to displacement by a competing product, it should be far more so to the gas company whose commodity is almost shielded from competition and whose profits on the sale of gas from an appliance continue for an infinite period. Though it is not recommended that gas companies should take space in the daily press without consideration of the cost involved, it is suggested that a more extended use might be made of newspaper publicity, and, what is more to the point, **better use might be made of the space.** In the case of a high priced article, always remember that it is preferable to allow a salesman to more fully explain its merits before mentioning in a public advertisement a sum which might otherwise kill the interest of the prospect. An illustrated advertisement undoubtedly has a greater appeal to the average reader than that which consists only of plain copy, and as the maority of manufacturers are willing to furnish cuts free of charge to those companies which do not feel justified in purchasing their own, it would appear to be wise practice to make somewhat free use of this service, as the suggested copy can, as a rule, be easily modified to harmonize with the cut and local conditions.

Co-operation and Enthusiasm Essential to Complete Success.

System alone can not make a successful department. Two other factors go hand in hand with it—co-operation and enthusiasm. Co-operation means that every employee must realize that it is his duty to assist in increasing the company's output, just as much as it is that of any salesman. The officials of the company, on the other hand, should in some way express their appreciation of such co-operation on the part of employees. This appreciation need not take the form of a monetary reward, even a word of acknowledgment being sufficient to encourage every right-minded man in this little recognized, but still exceedingly important, aid to the company's success. This spirit of co-operation can be most strongly developed if every individual employee can be brought to realize that his actual salary depends largely upon the results achieved by the sales department, for it is certain that the generosity of the company to its employes in the matter of salaries depends largely upon the net revenue. The sales department of the future and the one that will make the biggest records is the one that most successfully combines all three qualities—system, co-operation, enthusiasm. But the greatest of these is ENTHUSIASM!

"Quick Comfort" Gas Heaters

Copper Reflectors

THREE SIZES

	Depth	Width	Height	
No. 712 —	14 x	16	x 26	inches
No. 716 —	14 x	19	x 28	inches
No. 720 —	14 x	23½	x 30	inches

Asbestos Back with Return Flues—Large Radiating Surface.

Copper Reflectors—Three Sizes; Same as Above Equipped with Bunsen Burners. -:- -:- -:-

Incandescent Fuel Gas Heaters

With Full Return Flues

Cast Iron Fire Box

TWO SIZES

Neat, Attractive, Efficient

The Up-to-Date Gas Heater for Either Natural or Manufactured Gas

TRADE MARK QUICK MEAL

RINGEN STOVE COMPANY

Division of American Stove Company

825 Chouteau Ave. ST. LOUIS, MO.

TRADE MARK QUICK MEAL

OPINIONS *AND* COMMENTS

GAS LIGHTING WEEK.

It was Hodge, the talented writer of the Byllesby organization, who phrased the eloquent tribute to gas not many months ago in which it was said "there is nothing romantic about gas until you pause to reflect on the burdens it has lifted from the shoulders of millions of women; there is nothing beautiful about gas until you realize that all the exquisite dyes are made from its nasty by-product, tar." He might have gone even further and mentioned the benign influence of gas lighting on the eyesight of millions of men, women and children, for it is acknowledged by lighting engineers generally that it is the only artificial illuminant that is not injurious to the eye.

What a fine incentive this fact should be to the gas man, to wage his campaign more vigorously this fall for the modern gas light! He has other reasons, of course, to justify his increased activities—the economy of gas light, its reliability, its fitness for any environment. In addition to all this, his industry has set aside the week of Oct. 8th-13th as a special period in which he may devote his time and energies exclusively to this feature of his business.

Gas Lighting Week, because of the opportunities it presents for installing real beneficial illumination, as well as economical illumination, is one of the best of the numerous special business weeks now generally recognized by the American people. It has been extensively advertised in past years and there is no doubt that its results in 1917 will exceed those of former years by hundreds of thousands of new sales and installations.

CONSERVE FOOD.

The Food Administration bureau at Washington furnishes some interesting facts about its labors.

A San Francisco woman signed the food pledge, but with one reservation—she didn't see any necessity for cooking without butter.

A Chicago man signed the food pledge—but could not understand why he was asked to save sugar.

The editor of a trade journal signed the food pledge himself—but thought that its publication in his editorial columns was hardly justified, as it did not seem to be of any great technical interest to his readers.

The food pledge is making its way very rapidly with the whole American people, but the terrible world emergency behind it has not yet come home to all of us. Living in a land which now has the largest remaining stock of food in the world, we are a little slow to realize that this stock can not possibly be our own to use as we see fit, but must be divided with countries where famine is a constant haunting specter. We live in the midst of plenty this year. But famine is just across the seas, and next year, or two years from now, it may be in our own land unless we can realize the full significance of food saving today and adjust our habits to provide for tomorrow.

Every provision of the food pledge, from wheat to soap fats, has been carefully thought out after detailed study of the world's supply of food today and its probable supplies for several years to come.

Butter must be conserved because the world's stock of edible fats is rapidly diminishing and an increased production can not be secured except by organized effort in the dairy and allied industries extending over several years.

Sugar must be conserved because there is a serious, immediate shortage.

Every available medium for keeping the food pledge before every man, woman, and child in the United States must be used during the whole period of the war and even for a considerable period afterwards. For this problem of saving food is a responsibility put upon everyone every day. To the individual at the breakfast or dinner table it may seem one of the lesser duties of war. But in the mass it is one of our greatest and most immediate duties. Every publication and every person that aids in the daily work of reminding the American people of this duty renders a true patriotic service.

The GAS RECORD

MONADNOCK BLOCK, CHICAGO, U. S. A.

W. H. Graffis . . . . . *President*
H. D. Fargo . . . . . *Vice-President*
H. B. McMeal . . . . . *Secretary*
Herbert Graffis . *Treas. and Adv. Manager*
Milt Saul . . . . *Vice-Pres. and Editor*
Walter V. Turner . . . *Technical Editor*

SUBSCRIPTIONS

The subscription price of THE GAS RECORD is $2 a year in the United States, Cuba and Mexico; in Canada it is $3; in all other countries, $4; single copies, U. S. A., 25 cents.

ADVERTISING

THE GAS RECORD is issued the 2nd and 4th Wednesdays of each month. Copy can be accepted as late as the Monday previous to each issue. Where proof must be seen, allow ample time for transmission in the mails.

	Yearly Rate 24 issues	6 mos. Rate 12 issues	3 mos. Rate 6 issues	Less than 6 issues
Full Page, per issue . . . . :	$40.00	$46.50	$50.00	$54.00
Half Page, per issue	22.00	25.00	27.00	29.00
Fourth Page, per issue . . .	12.00	14.50	16.00	18.00
Eighth Page, per issue . . .	7.00	8.00	9.00	10.00
Sixteenth Page, per issue .	4.00	4.50	5.00	6.00

Classified Advertising — "Wants," "For Sales," etc.—5 cents a word per insertion, minimum charge $1.

Entered as second-class matter at the post office at Chicago, Illinois, under the act of March 3, 1879.

Vol. 12 No. 6 — CHICAGO — Sept. 26 1917

TELL THE PAPERS.

Here's a bit of sound advice, adapted from the Plumbers Trade Journal:

"In all probability, you advertise in the local paper—all live concerns do. Has it occurred to you that the local papers will give you a lot more publicity than you are now getting if you only study the situation and interest them in some of your recent installations; your novelties in accessories; the new contracts you have signed up; the work you have completed; the advantages gained. Most any paper regards all this as of big interest to its readers and will gladly publish it as legitimate news. Push your opportunity in this regard; be something more in your home paper than merely the gas company. Let folks know that you are a necessity in the town. You will get a lot more business if you do, and more business should mean more profits."

SELLING GAS

Quincy's System

How Hotel Range Installation Was Secured and Business Retained

The Quincy (Ill.) Gas Electric & Heating Co., through Commercial Manager L. W. McLellen, has recently installed in the Newcomb hotel, of that city, three sections of "Garland" hotel ranges. The closing of this contract was the result of continuous and persistent efforts.

When the commercial department first turned its efforts toward installing gas for fuel at this hotel coal and coke were being used entirely. The first appliance installed was a gas-fired broiler; after this appliance was in successful operation the effort was concentrated on the installation of a Blodgett baking oven. After some time had elapsed this effort was finally re warded by securing the contract Then, realizing that only one step remained to put an all gas kitchen in service, after several months the management was approached on the subject of the installation of a three-section hotel range, for general use.

At this time a three-section coal range was being used, and it was at an age where the maintenance cost on it was becoming very noticeable. After securing the actual coal fuel cost, it was shown the management that there were several items that it would be necessary to add to the actual coal cost, such as cartage of ashes, cost of cleaning and repairing flues, cost of wood in starting fires, and the inconvenience of having to maintain proper storage facilities. After adding these different costs, the gas company believed that by the proper operation of certain types of gas ranges, the same amount of work could be done at a monthly cost not to exceed that of using coal.

In order to keep a record for comparisons, the result was obtained of the maximum number of cubic feet of gas that it would be possible to use daily to keep within the limit of coal fuel costs. It was then explained that by taking as a basis, the same amount of business that had been done in the past, their cost of operation by using gas would not exceed their former costs and could be kept within a certain amount, which was specified. In addition to the item of cost, the amount of time saved would be very noticeable, as would also be the difference between the convenience of using gas and that of using coal.

The contract was closed and the installation completed on July 5th. A 2-inch fuel line was run direct to the ranges and a separate meter was installed. A representative of the gas company read the meter daily for the first thirty days and during this time the steward and the chef were instructed as to how to take daily readings. After the meter was read each day the chef was informed of the amount of gas used during the previous day and was given a certain amount for consumption which he should not exceed each day. At the end of the fifth day the consumption was reduced to the estimated amount and has been held within that average. At the end of the month the total amount of gas consumed and billed was within the amount that had been estimated as the gas fuel cost. At the beginning of the second month the chef was informed that among his daily duties he would be expected to read the gas meter and keep his daily consumption at the amount at which it had been shown it could be kept.

Mr. McLellen explains his system as follows:

"Holding hotel business is more difficult than securing it, but it can be successfully accomplished if daily readings are kept and an effort made to secure the co-operation of the hotel employees that are directly interested. After their co-operation is secured it is equally important that one of them be put in direct charge of the installation so as to watch the daily operation cost continuously. An entirely new system is always necessary when gas is installed, for on the former fuel operation it was not necessary or convenient to keep account of daily costs.

"Another item that is equally essential in this class of business is keeping track of the number of meals served, so as to be able to show the cost per meal. As the volume of business increases, we are still able to show this cost and justify the comparative increase in gas consumption.

"In obtaining hotel business great care should be taken in securing an economical and efficient type of range. This point being successfully determined, the gas company, by watching the installation as outlined in the foregoing experience, can always be assured of having added a customer that will prove a most satisfactory advertisement for it."

THE MARKETS.

Small Demand for Cast Iron Pipe —Benzol 50 to 60 Cents Per Gallon.

New business in the New York cast iron pipe market materializes slowly. It has been some time since there has been municipal buying of importance and private buying is only fair. Prices continue unchanged at $65.50, New York for 6-inch, Class B pipe and $68.50 for 4-inch, Class B.

Prices on Coke Oven By-Products.

Spot—Per gallon at producers plant; pure benzol, $0.53 to $0.60; toluol, $1.75 to $2.00; solvent naphtha, $0.18 to $0.20. Per pound at producers plant: Phenol, $0.42 to $0.45. Per 100 pounds at seaboard: Sulphate of ammonia, $4.85 to $5.00.

Contract—Per gallon at producers plant: Pure benzol, $0.50 to $0.55; toluol, $1.50 to $1.80; solvent naphtha, $0.18 to $0.20. Per pound at producers plant: Phenol (nominal), $0.42; per 100 pounds at seaboard: Sulphate of ammonia, nominal.

Full Coke Prices Almost Prohibitive.

During the past week quotations at St. Louis have ranged from $13 to $13.50, at ovens, for Connellsville and Virginia 72-hour foundry coke. The freight rate to St. Louis from the producing section is $2.95. Many of the inquiries are patently feelers, and little real business has resulted. Consumers are pretty well covered with contract coke, and able to play a waiting game. The demand for fuel coke is beginning to show symptoms of activity, but prices are almost prohibitive.

In Cafeterias

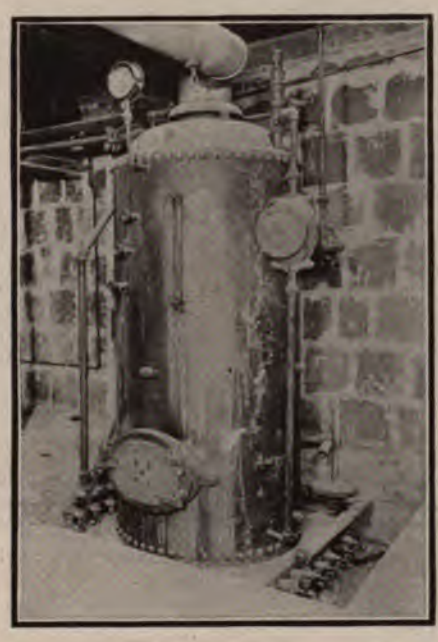
In One Place 2,200 Meals Per Day Are Made Possible by Use of Gas

The cafeteria, that Chicago institution of noon-day feasting where one "doubles in brass" and plays both guest and waitress in order to defeat the high cost of "Loop" living, has set a fine example to all restaurants by adopting gas as its principal fuel for cooking and water heating. There are in Chicago half a hundred or more cafeterias, and it is a tribute to the intelligent activities of Ivan Hoy, chief of the hotel and restaurant department of the Peoples Gas Light & Coke Co., that practically all of these use gas wherever that clean and convenient commodity can be piped to a useful outlet.

The cafeteria, it must be understood, is perhaps the most economically conducted of all public eating places. At the same time, it takes first place among the clean "quick service" restaurants, for it is designed to give instant service where others perhaps are content to serve on a minute or two-minute schedule. The very nature of the cafeteria makes speed its first quality, with economy and cleanliness neck-and-neck seconds. With these prime requisites in mind, it can be clearly seen that the adoption by the cafeteria of gas as its fuel is one of the strongest endorsements that can possibly be given to gas along the line of hotel and restaurant service.

Let us look at a typical cafeteria installation and see just how speedy, cleanly and economically it is conducted through the medium of gas fuel. Mr. Hoy has furnished for the benefit of the industry the example of the Lake Street Cafeteria, at 6 Lake St., Chicago. With figures and photographs the precise quality of gas service in this establishment is accurately demonstrated.

The Lake Street Cafeteria has a seating capacity of 450, which means that its regular daily patronage requires 2,200 meals served. This number of meals is obtained by actual reference to the books of the management. The average price paid by guests for these meals is 26 cents. The monthly income of the place averages $17,160. The monthly gas bill is $150 on an average, with gas at 40 cents per 1,000 cu. ft. The fuel cost per dollar of income is therefore $0.008. The kitchen proper is equipped with a two-section hotel range, which cost $215 to install. The annual gas consumption for the entire place is 4,500,000 cu. ft. The installation includes a bake oven of 2,100 loaf capacity for bread and pastry.



Gas Fired Boiler in Chicago Cafeteria.

After the food is cooked in the kitchen proper, it is brought up to the main dining room, where it is kept hot for guests by means of a 75-ft. gas steam-table, behind which the neat looking girls stand ready to serve portions to the long line of customers as they pass along. Two five-gallon coffee heated urns heated by gas furnish the most popular noonday beverage for the hungry workers.

Naturally a highly efficient hot water service of great capacity is necessary in a place like this. Here, too, gas has proven its superiority over other fuels and won a permanent home. In the basement of the cafeteria there is a 280-gallon tank supplying hot water to the kitchen on the second floor. The water is heated by a steam coil supplied with steam from a gas fired boiler. This boiler, 36 by 72, 15 h. p., has automatic control on water and gas. It is low pressure. Besides its duties in supplying steam for the hot water tank, it furnishes steam for the steam-tables, coffee urns, stock kettle, vegetable and dish-washer. The installation cost on this important appliance was $555.

Natural Gas Supply Men Elect Officers.

At the meeting of the directors of the Association of Natural Gas Supply Men the following were elected as officers for the coming year: President, David O. Holbrook, Natural Gas Association of America, Pittsburgh; vice-president, William B. Way, Ludlow Valve Manufacturing Co., Pittsburgh; secretary, Larmour Adams, Metric Metal Works, Pittsburgh; treasurer, T. C. Clifford, Pittsburgh Meter Co., East Pittsburgh.

Dining Room and Steam Tables in Chicago Cafeteria Where Gas Service Makes it Possible to Serve 2,200 Meals Per Day.

Breaks Records

Syracuse Salesmen Secure 257 Orders for Water Heaters in 2 Weeks

A water heater sale that is believed to be a record breaker was conducted recently in Syracuse, N. Y., by Commercial Manager A. D. Dudley; 257 orders were taken for Humphry automatics in the space of 12 working days and, since the close of the sale, 25 more heaters have been sold. A good indication of the business possibilities existing at this time in the automatic water heater line is presented in the fact that more heaters were sold on this sale than on any other sale ever held. What a vision of sale possibilities this should unfold to all gas companies! In these days the necessity of getting business with no appreciable addition to capital expense is very pressing, and this sale points a way to do it.

The energetic business getters who worked on this sale are shown in the accompanying picture. One of the most active of those in the group was Chas. B. Hindon, shown in the upper left hand corner, representative of the Humphrey Co. in New York state A score board used for keeping track of the daily sales by the representatives of the Syracuse Lighting Co. is illustrated. In connection with the sale there was a window display, which is also illustrated.

Group of Syracuse Salesmen Who Sold 257 Automatic Heaters in Two Weeks.

HEISS GETS PRIZE.

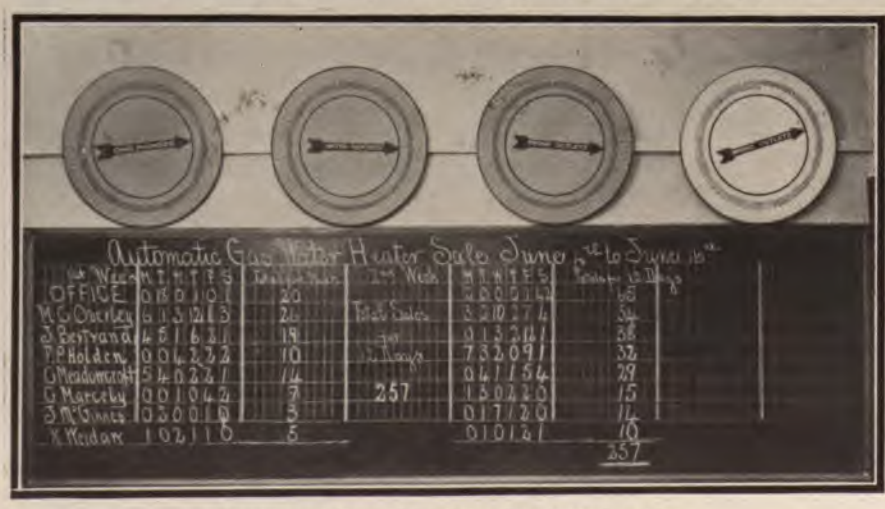
Winners in McJunkin Contest for Gas Companies Recently Announced.

The Wm. D. McJunkin Advertising Agency announces the decision of the judges in its $100 prize contest for window trims and sales ideas, as follows:

Window trim contest, $50 in prizes: First prize, $25—United Gas Improvement Co., Philadelphia, Lawrence C. Heiss, trimmer; automatic gas water heater display; second prize, $15—Public Service Gas Co., Newark, N. J., S. H. Alexander, trimmer. Cabinet gas range display; third prize, $10—Mohawk Gas Co., Schenectady, N. Y., Robert Weidow, trimmer, gas room heater display; honorable mention—The Rome Gas, Electric Light & Power Co., Rome, N. Y.; Pawtucket Gas Co., Pawtucket, R. I.; Waukesha Gas & Electric Co., Waukesha, Wis.; Consolidated Light & Power Co., Kewanee, Ill.; Consolidated Gas Co. of New Jersey, Long Branch, N. J.; Portsmouth Gas Co., Portsmouth, Va.; Lebanon Gas & Fuel Co., Lebanon, Pa.; Brooklyn Borough Gas Co., Coney Island, N. Y.; Detroit City Gas Co., Detroit, Mich.; Ashville Power & Light Co., Ashville, N. C., Blackstone Gas & Electric Co., Woonsocket, R. I.

Sales Idea Contest, $50 in prizes: First prize, $25—Mohawk Gas Co., Schenectady, N. Y., Robert Weidow, gas water heater sale; second prize, $15—Philadelphia Suburban Gas & Electric Co., Chester, Pa., John D. Creamer, advertising manager; third prize, $10—Everett Gas Co., Everett, Wash., Robert C. Coffy, general manager, good will plan; honorable mention—Niagara Light, Heat & Power Co., Tonawanda, N. Y.; Pacific Gas & Electric Co., Phoenix, Ariz.; Citizens Gas & Electric Co., Waterloo, Ia.; Kingston Gas & Electric Co., Kingston, N. Y.; Knoxville Gas Co., Knoxville, Tenn.; Blackstone Valley Gas & Electric Co., Woonsocket, R. I.; Quincy Gas, Electric & Heating Co., Quincy, Ill.; Portsmouth Gas Co., Portsmouth, Va.; Western United Gas & Electric Co., Aurora, Ill.; Bangor Gas Light Co., Bangor, Me.

The judges were: Window trim contest, B. J. Mullaney, advertising manager, Peoples Gas Light & Coke Co., Chicago; Allen H. Kagey, head window trimmer, Mandel Bros., one of Chicago's most exclusive retail establishments; C. M. Herr, head window trimmer, The Fair, Chicago's popular-priced store; sales idea contest: O. T. Knight, commerical manager, Peoples Gas Light & Coke Co., Chicago; John G. Learned, assistant to the vice-president, Public Service Co. of Northern Illinois, Chicago; Herbert Graffis, advertising manager, The Gas Record, Chicago.



Blackboard Record of Sales By Syracuse Men.

In New Orleans

Food Conservation Is Taught by the Local Gas Company's Experts

One of the most interesting and effective campaigns ever instituted in the south for educating the public along lines of food conservation and household thrift, was that which took the form of a demonstration during the week beginning August 20, in New Orleans. Co-operation with the City Federation of Women's Clubs enabled the New Orleans Gas Light Co. to reach a class of housewives that are not usually attracted to such exhibitions.

The clubwomen of New Orleans are exulting in pride over a new contribution to war-time cookery known as "Victory" products. These consist of bread, cakes and pastries made by the use of cottonseed flour, a product rich in protein and fat which other flours lack. Used in combination with flours supplying the starch necessary for making acceptable doughs, an extremely palatable and nutritious article known as "Victory Bread" is obtained.

Sales Manager J. T. Flautt, in telling of the campaign, says:

"Using the enthusiastic interest in 'Victory' products as the center about which our education week should revolve, we offered the use of our attractive salesroom for a week's cooking school and demonstration. The sales manager, assisted by Mrs. B. Armwood Perkins, a demonstrator and teacher of domestic science at Tampa, whom the New Orleans Gas Light Co. had brought to the city to look after the establishment of a school of domestic art for negro girls and cooks, equipped an attractive all-white kitchen on a platform in a conspicuous corner of the salesroom. From this platform each afternoon, lessons in the preparation of 'Victory' products were given, accompanied by talks on some practical subject in home economics of special interest to housewives in these times.

"Each day's program was so arranged as to include a brief address by some prominent clubwoman, all of whom expressed keen interest in the food conservation movement. Touching, through its domestic fuel, the lives of more housewives than perhaps any other public corporation in this vicinity, the gas company appreciates its opportunity to assist in this patriotic movement and plans to do its part in teaching the women of New Orleans how to co-operate with President Wilson and the food administration in making the housewife's apron a uniform of national significance. President Benoist of the company considers such effort no sacrifice to business interests, as it brings the company into most intimate touch with its consumers, and makes wholesome sentiment."

In a graceful and effective manner, Mrs. Perkins was able each day to show the part the gas range plays in the conservation movement. Nestled among draperies of the stars and stripes were shields containing such words as these: "A gas range is a blessing for the poor, rather than a luxury for the rich; it saves money, time and labor."—"Gas, the thrifty housewife's fuel, no waste to pay for, pure heat units."—"Bake Victory Bread the Gas Way and Help Win the War."

How to use the gas oven economically was given great emphasis in this demonstration, while the afternoon devoted to the subject "How to Eliminate Waste" gave place to the discussion of methods of canning and preserving and dehydrating, and the ease and comfort with which this work may be done in a gas kitchen.

Sales Manager Flautt reported the sale of eighteen ranges, eight irons and one water heater on the opening day of the demonstration, these sales having been made in the office; throughout the week extraordinary success in the sales department proved such campaigns to be of great commercial value to the company.

President Benoist considers this a most opportune time for the launching of a movement that will mean permanent good to the home life of the community as well as benefit to the company, so plans are being made for the opening of the largest domestic science school in the south for colored cooks, about October 1. This step insures more satisfaction among housewives, who almost exclusively employ colored cooks that are generally extravagant in the management of the gas range, and coming at this time when economy is the watchword in every home, both as an individual necessity and a patriotic duty, it is receiving the hearty support and appreciation of all the people.

Canning in Utah

Model Plant Operated With Gas as Fuel Wins Government Approval

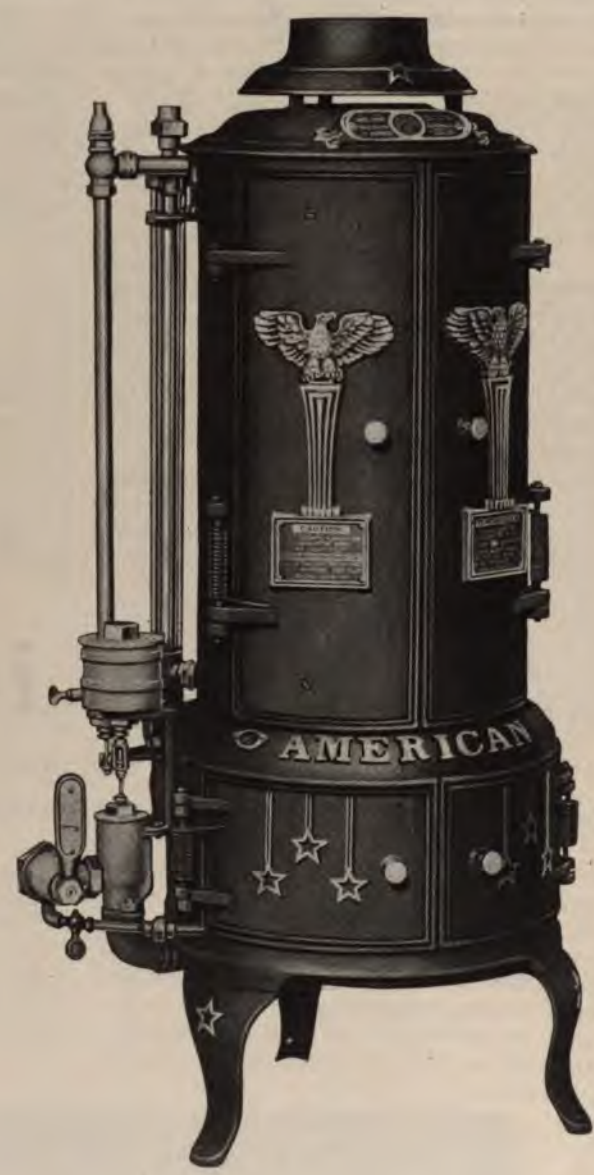
Salt Lake City leads in the real work of food conservation, according to the statement made by Assistant Secretary of Agriculture Carl Vrooman, who visited the municipal market and cannery in that city recently. He said further he would take the plan followed there as a model for other cities. Inquiries have come in from various parts of the country asking for more information on the working of the plant, says the "New West" Magazine.

The Salt Lake municipal conservation and demonstration kitchen situated at the municipal market was opened July 1 directly through the efforts of

Food Conservation Class in New Orleans

THE AMERICAN AUTOMATIC WATER HEATER

"A heater as good as its name"



This is the new American Heater. Note the simplicity and originality of design, also the large doors, giving immediate and easy access to the coil, which can be cleaned or removed without taking the shell apart. In no other heater are the parts so accessible. It is exclusive in its details and provides a new era in water heater construction. Write for descriptive matter.

American Water Heater Co., St. Louis, U. S. A.

THE AMERICAN AUTOMATIC WATER HEATER

"A heater as good as its name"

Note the patented combustion chamber. This is one of the many exclusive features.

The burners are placed around and outside the periphery or outer edge of the coil, and are protected from any water of condensation by the canopy top.

The water of condensation passes ½ inch in front of the burners. It is caught in a drip pan placed under the burner combs and is evaporated by the heat from the burners.

There is absolutely no opportunity for erosion, through the acid effects of the condensate water, nor is the burner efficiency impaired, even to the slightest degree, as the condensate water, at no time, comes in contact with the burners or any part of the heater, with the exception of the drip pan. The burner ring or manifold is below the combustion chamber leaving it clear and free for cleaning purposes.

The air to the burners is taken from the bottom and center of the heater, is deflected from the bottom of the drip pan to the burner tubes, the air being kept at a uniform temperature not affected by the heat from the burners.

The ignition to the burners is secured from a pilot light having but two small lava tips.

It will be readily noted on the cut that this pilot light not only gives instant ignition to the burners, but it is also noiseless. It is protected from the condensate water and furthermore from any down-drafts that might occur. The possibility of its being blown out is eliminated.

Immediately above the pilot is a mica-covered orifice, so that the pilot light is always visible. This saves much effort in the lighting of the pilot, and it can always be ascertained whether the pilot light has been inadvertently extinguished.

This system of combustion has proven remarkably efficient. The flame is floating and so projected that each part of the coil is equally influenced. It concentrates on no particular point. It is even in distribution, and this, together with the long flame travel, produces an efficiency equalled by no other heater.

American Water Heater Co., St. Louis, U. S. A.

the women's conservation committee, which is a sub-committee of the City Council of Defense.

The city has paid all expenses of equipping the plant, enclosing a portion of one of the long market sheds for the purpose, with storage room for bottled products and a kitchen where the actual canning is done. A screened-in room is equipped with high tables and high stools, where the preparation work is done. Two gas ranges, a large burner for the steam pressure canner and a water heater were installed by the Utah Gas Co., free of charge, simply collecting for the amount of gas consumed. The cooking of vegetables is done both by the steam pressure canner and with the ordinary cold-pack boiler method, so that housewives may be able to follow the instructions with the ordinary home equipment.

The kitchen was started with three aims in view. First, to teach women how to put up vegetables and fruits for themselves. Second, to increase the food supply by as much as the limited capacity of the plant would allow, and, third, to take care of such products from the municipal market as might go to waste otherwise. For instance, many tomatoes are offered for sale which become somewhat soft and spotted and which ordinarily find their way to the garbage dump, but which can be utilized to make excellent catsup by using only the sound portions. The culls from the sweet corn, which is ordinarily fed to the pigs, may be carefully sorted and the sound portion dried. Two demonstrators have been employed at the plant, all other work being purely voluntary.

Mrs. W. F. Adams, president of the City Federation of Women's Clubs, who is in direct charge of the cannery, has placed it on a systematic business basis. Mrs. Adams arrives at the cannery at 7:30 each morning. She plans the work with the demonstrator and her assistants for that special day. A bookkeeper has volunteered her services. When Mrs. Adams is "resting" she is going over the books with her assistant, attending meetings called by the state and national Defense Committee, or putting up quantities of fruits and vegetables in her own home.

There are volunteer assistants for each morning and afternoon. These assistants personally see that there are plenty of helpers. At 8 a. m. the first shift arrives, which generally consists of housewives who go early to do their marketing and remain for a few hours to help prepare fruits and vegetables for the canners. Those who have pressing home duties are relieved by another shift at 10 o'clock. Many girls' clubs and women's organizations volunteer certain shifts, so that only a few hours a week are required of any one organization or group of volunteers. The Boy Scouts have given their services and help bring in the fruits and vegetables, donated by many of the farmers. The glass jars are bought at wholesale. The prepared fruits and vegetables are sold at cost and the proceeds go to help defray the expenses of the plant. Those left over will be placed in a municipal storehouse for winter emergencies. An inspiring example has been shown in the way the women of all classes have served, "doing their bit" towards increasing the food supply, preventing waste and helping to win the war.

PARR'S LETTER.

Dayton Gas Man Tells of His Work on French Front Driving Truck.

An interesting letter from D. J. Parr, one of the Dayton (O.) Gas Company boys who went to France this summer with the Dawes' ambulance outfit, has been received by Frank Hutchinson, of Cleveland. It reads:

"Somewhere in France, July 14, 1917.

"Dear Hutch:

"Your letter came last night and I was sure glad to hear from you and get the news of old U. S. A. When I last saw you I had thought a lot about coming to France and doing my bit but I only half appreciated just what I was getting into. War is sure a serious matter and Sherman was right even though he had but a small taste of it. Here I am in Northern France near the lines and driving each day a 5 ton Pierce-Arrow camion (truck) full of shells to the French batteries. Nitroglycerine wagons in America are dangerous but they did not have to dodge German shrapnel in the bargain.

"We came over originally to drive American ambulances but things have so rapidly changed and camion work is so necessary and needed that we joined the French forces and are now seeing some real action. Just a page from my diary to show you (minus dates and places; censor bars it) what our day, or rather night, consists of. Up early and spent day working on engine and chassis of car. Orders for run in convoys, to start at 4 p. m. All ready with extra water, 50 gals., extra gasoline and plenty of oil. Started through ———, loaded with 5 tons of 75 B.C. shells in cases and while waiting for dusk ate our lunch of beef, army bread, pinuard (French red wine), chocolate and petite beurre (cakes). All ready again with the dusk, for we travel a road in view of Boche (German) artillery and are under shell fire to the French artillery batteries.

"Arrived at 12 p. m. safe, after driving at 20 miles per hour over dark road and very dusty with the camion one hundred yards ahead and the ditches for your guide. Only rule you have is, go as fast as you can, keep to the right and 100 yards distance between cars. Now, maybe it may sound easy but you know you have been somewhere after guiding this load of bread for the Heine's for 30 or 40 miles. After unloading, the batteries of the French began action and sent probably 200 shells when the Germans began coming back at them and incidentally at us. Well, it is very hard to describe the arrivals, as they are called. Your hear a big shrieking noise coming through the air and it grows more intense the nearer it comes. Then, if it goes over your head or to one side, you watch for the explosion and then the damage done. Where the real sensation comes, is when they drop short, or are coming straight for you and the shrieking lessens and you just wait. Just wait. I actually believe you don't even think; you only wonder where in the hell it went; but you soon know. It just takes one of them to send you running to the dugouts, or on a long journey. Bravery is a joke when they begin coming into your neighborhood. None of the old gags about the color of blood goes here. You don't have time, or you are moving too fast for any other action.

"Soon on our way back to camp Could not take same route back, as it was being continually shelled as they had already doped our return. Took another route and arrived safely about 4 a. m. Filled cars with water, gasoline and after washing dust from our eyes crawled in until 10 o'clock, then breakfast and few camp duties and rest until more orders. Not a bad day's work, and enough excitement to make it worth while.

"Well, Hutch, today is France's Independence Day (same as our July 4th) and we have been given a bottle of champagne apiece and the party is on. I would like to write you longer but our time is really limited and today is a big rest day for us. France is sure at war and has borne the fighting for 3 long years and is all in, absolutely all in. America can help and is being counted upon but I only hope they come as they should, prepared with men and supplies to whip a world's foe and for a long, tedious fight. Nothing but America at its best can do the job. You can't half appreciate just what America is up against.

Gas as War Aid

Its Use in Agricultural Machinery Plants Proves Highly Satisfactory

By Harry L. Wolfe

Second only to munitions manufacture in importance now is the production of agricultural machinery and here again gas has come to the front as the dependable fuel. In a tractor factory in a western city crude oil was considered and as the factory was a new one we asked the privilege of building and installing gas forges subject to their approval as to convenience, speed, comfortable surroundings and general superiority. The principal operation under consideration at this time was the upsetting in a bulldozer of tractor wheel spokes, size of pieces 5/8"x1¼", and heated at the end of the 6", each piece being heated twice and passing through two operations, the roughing and flattening.

Blower Equipment for High Temperature Gas Furnace.

Naturally this is high temperature work, being practically a welding heat. We outlined our desires to an appliance company after a careful survey of our customer's demands and installed the first furnace. It was lined with fire brick and with a facing coat of carborundum. This did not prove perfectly satisfactory so we relined the furnace with high temperature cement which is the best lining we have found yet and stands up about a week under the hardest operating conditions. The photograph shows the type of forge which we found to be most practical. The heating chamber is directly under the work and the adjustable top may be raised or lowered to just permit the entrance of the piece to be heated, the back being closed up with fire brick if short heats are being made.

The burners each enter at the bottom of a circular vertical chamber 6" in diameter and 4½" deep, the wall between the "wells" or chambers being ¾" thick at the narrowest point. Relining is done by packing the filler around a steel form which is then removed and the lining is then slowly dried. No special burners are necessary, as we use a ¾" gas pipe burner with the end open and renew them when we reline the furnaces.

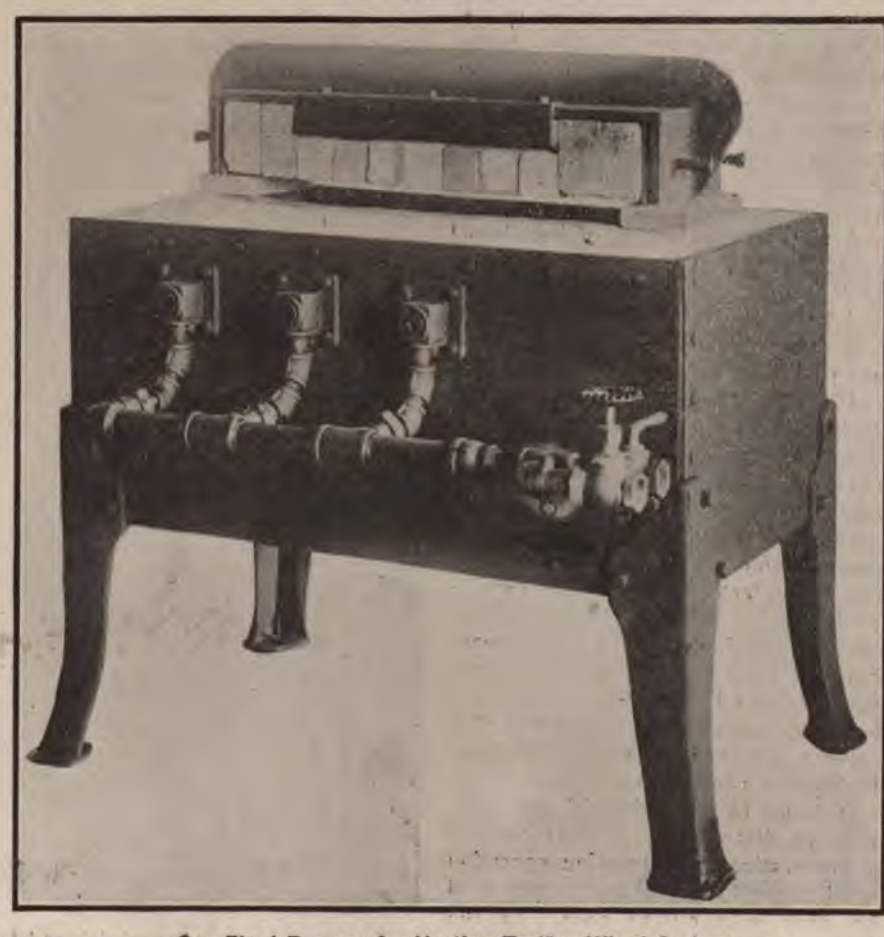
Capacity of 2,000.

The desired daily output of these spokes, 5/8" x1¼", was 2,000. We easily do this with two of the furnaces, having built a second one on the job to match the one we reconstructed to meet the special conditions at this factory.

Gas is served through 100 B type meters at 4" pressure and air at positive pressure from a 3.3 Connersville blower at 1¼ lb. pressure. We installed recording pressure gauges on both the gas and air lines and will sell same to customer after they become conversant with their use. The gas consumption of the two forges at their best working speed is 1200 cubic feet per hour. As we are using gas in various other operations in this and their adjoining factory, a rate is earned which shows a cost of less than thirty cents per hundred for making these spokes.

After getting the installation down to a proper working condition we conferred with the management of the factory, who stated that they "were fully satisfied that gas was the proper fuel to use," and paid us for the equipment. We are now able to have this perfected forge made up by an appliance company after the plans and specifications of the appliances with which we got these satisfactory results.

We have just completed the installation of two of these forges at Galva,



Gas Fired Furnace for Heating Tractor Wheel Spokes.

Ill., in an agricultural implement plant that had been using crude oil. At this plant we found that about eighty-five per cent. of their work in forging was "bends" of pieces of the following dimensions:

No. 1—1¼"x$\frac{3}{16}$" strip soft steel heated for 6". Output, 700 per hour from circular gas forge on a gas consumption of 160 cubic feet per hour.

No. 2—½" round bar bent at 45 degrees angle. Output, 500 per hour. Gas consumption, 160 cubic feet per hour.

No. 3—1" round bar bent at end. 350 per hour.

Also various other pieces are heated and bent.

Welding Plow Shares.

We are welding corn cultivator plow shares, using a borax flux. This operation is done in the special forge as outlined previously and shown in photograph and is very satisfactory. This factory is not one of the largest and we found that a considerable waste was made by running oil forges. The many changes in specific gravity of the oil obtained, together with the fluctuations in costs, kept our customer in a constant worry. The price being paid for oil when we made this installation was ten cents per gallon. The gas rate earned is approximately seventy cents per thousand cubic feet. At a factory in another of our towns, which has a contract to make transmissions for a truck used by one of the countries at war, we have recently installed a large carbonizing and annealing furnace, a 16" lead hardening furnace and various other furnaces using gas.

A feature of this type of lead hardening furnace is a patented skirt and shelf which extends around the top and level with it, being heated by the flue gases, and upon which the pieces are preheated before immersion in the red hot lead, it being necessary to preheat these parts owing to the sudden shock due to rapid change of temperature. We now have nine of these lead hardening furnaces in operation in another transmission plant whose gas consumption in August was 556,000 cubic feet. Fuel oil was considered here but as a lead hardening furnace runs at from 1450 to 1600 degrees Fahr., it must be lined with brick and when using oil the uniformity of temperature cannot be maintained but mounts up and generally produces faulty and uneven hardening.

It is up to the industrial gas engineer to determine just what part of a prospective manufacturing operation can be done by gas and what part must be done with oil or coke. In the larger factories where an oil system has been in use for some years they generally are fortified by oil contracts at a low rate owing to their consumption, adequate storage facilities, heavy investment in pumping and other necessary equipment, and it is practically impossible to get them to change to gas until such a time that oil reaches a figure where gas is a contender for the fuel business. Just what that price is, of course, varies according to local conditions. There is, however, a certain amount of this forging business that can be secured for gas but only by hard, persistent effort and a willingness on our part to make approval demonstrations and backed up by the co-operation of the gas appliance manufacturer (which is conceded) after they get the proper information from the "man on the job" and without which no reasonable headway can be expected to be made.

A RAGAN WINDOW.

It Represents Cellar With Old and New Way of Heating Water For the Bath.

Louis E. Ragan, the window trim expert of the Rome (N. Y.) Gas, Electric Light & Power Co., recently installed another very attractive Humphrey water heater display. He made up the window to represent a corner of a cellar and kitchen showing the old and the new way of heating water for the bath. The background representing a stone cellar wall was painted by one of the employes. Beaver board represents the cement floor and a No. 3-A automatic heater is installed in the corner. The kitchen contains a coal range with a wash boiler and tea kettle of water setting on it ready to be heated when the fire is lighted. The fire box is full of paper and kindling ready to be lighted, the box of matches sets on the warming shelf, while the floor and stove hearth are littered with burned matches, ashes, kindling and coal.

Ragan's Water Heater Window at Rome.

Hot Water "Quick as a Wink" a Convention Feature.

The Pittsburgh "Bungalow" three gallons per minute automatic hot water heater was the center of attraction at the Master Plumbers' convention, Evansville, Ind. This attractive booth featuring the "Pittsburgh" and Pittsburgh "Bungalow" automatic water heater was visited by almost every master plumber that attended the convention. A Pittsburgh "Bungalow" heater was connected up and conclusively demonstrated its efficiency. It seemed that almost all the delegates were interested in water heaters and after examining both of these heaters, agreed that the heater's slogan "Hot Water Quick as a Wink," was all that it implied. The sole idea of the Pittsburgh Water Heater Co. exhibiting at this convention was to acquaint the plumbers with their plans of co-operation, and demonstrate that co-operation by and between the plumber and gas company and not competition is the successful policy on which to conduct business.

Big New Gas Well Struck in Ohio Field.

The Ohio Fuel Co. has drilled in a gas well estimated to be producing 25,000,000 cubic feet of gas daily on the Gibson farm in Richland township, Vinto county, Ohio. This is said to be the largest gas well in southern Ohio.

CURRENT ADVERTISING REVIEW

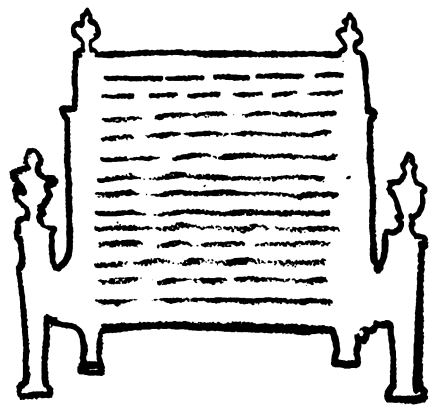
Wm. H. Matlack has a good idea for making gas company ads stand out on the page. He suggests an outline of the appliance to be advertised as a border for the advertisement. Sketches showing how this works out are reproduced here. There is no string attached to this "tip" and Matlack says go ahead and use them if they look good to you.

The McJunkin Gas Ad Service for September contains four of the best

A Matlack Idea.

of recent gas advertising features. These are illustrated on this page. Helping Hoover, the favorite indoor sport of the patriotic cook, is played up in two good pieces of copy. The gas lighting game is given a striking send-off in the copy headed "Is Your Eyesight Precious to You?" The illustration that goes with the advertisement headed "The Reliability of Gas," is a story in itself.

The U. G. I. at Philadelphia is driving King Coal out from the kitchens where he has been firmly entrenched. Powerful advertising is hammering away the "let well enough alone" attitude. A list of eating places is being worked to the limit with direct advertising matter, all of it of a specialized nature. For instance, there's a little folder showing a bunch of oysters bearing the label "September 1st." They are trooping from the seashore to a "sea food" restaurant. The folder is headed, "Have you everything ready?" This folder describes the gas equipment for the sea food places that are so popular



Matlack's Suggestion.

in Philadelphia. It is bound to do business. "Another Throne Vacated" tells about gas shoving King Coal out of Philadelphia kitchens. In the copy is the following statement:

"The operating cost of a coal range is double the cost of the coal. Here's what makes it so: 1. Coal. 2. Coal storage. 3. Wood, oil and charcoal for kindling and forcing fires. 4. Labor to build and attend fires. 5. Labor for removing ashes. 6. Ash storage. 7. Hauling ashes. 8. Fire-box linings for range. 9. Rings and plates for range. 10. Labor to make repairs. 11. Labor to clean flues and chimneys. 12. Victuals spoiled by irregular heat. 13. Coal buckets, shovels, etc. Fill in an estimate of the cost of these items and see the result."

Blodgett ovens and Garland hotel equipment also come in for "feature" advertising by means of which the U. G. I. is completing its conquest of Philadelphia kitchens.

The Ricketts incinerator is the subject of an attractive folder and letter sent out recently by the Peoples Gas Light & Coke Co., of Chicago, to its customers owning homes. This company has been actively pushing the incinerator for several months and finds ready sales among the folks who wish to promote hygienic and sanitary living. It has been installed in many fine homes, half a dozen hospitals, restaurants, cafes and the like. A special salesman is engaged in the incinerator campaign, which is all the year round.

The Peoples Gas Light & Coke Co., of Chicago, has recently used with good effect a special pamphlet on the Clow Gasteam radiator. It is a handsome publication, finely illustrated, and contains typical installations of this appliance in every kind of building, particularly stores, factories, churches, homes and offices. The company's advertising department reports excellent returns from the distribution of this booklet.

The Shepard Electric Crane & Hoist Co., of Montour Falls, N. Y., is distributing a handbook on its electric cranes and hoists. Details of construction include descriptions of the motor, hoist frame, controllers, gearing brakes, bearings, methods of lubrication, etc. This portion is followed by several pages on terms and conditions, discounts, etc. The greater part of the booklet is devoted to specifications and sizes of hoisting apparatus and motors illustrated by diagrammatic views. The booklet embraces 115 pages

Four McJunkin Specials.

LEGAL DECISIONS

Furnishing Natural Gas to City for Fuel.

Under an ordinance granting a franchise to lay gas pipes, in consideration of which the holder and its assigns should furnish the city free of cost all the natural gas necessary for fuel for the buildings of the police, fire, markets and city property departments while the pipes were in use, the successor to the franchise was not required to furnish gas to buildings subsequently constructed by the city and which could not be classified with those under the control of such departments at the time of the passage of the ordinance.—City of Pittsburgh vs. Equitable Gas Co., Supreme Court of Pennsylvania, 100 Atlantic, 1049.

Free Gas Must Be Supplied to Township.

On a bill in equity by a township and school district, it appeared that a gas company under contract with the township had secured the right of laying its pipes in the most expedient manner in consideration of furnishing free gas to the township and district, that gas was furnished thereunder for 29 years, when the company's successor notified the township that it would charge for gas so furnished, and threatened to cut off the supply if not paid by the township. Held, that it was without standing to refuse further performance on the ground of a want of consideration.—Vernon Township vs. United Natural Gas Co., Supreme Court of Pennsylvania, 100 Atlantic, 1007.

Contract To Furnish Gas Based on Sufficient Consideration.

A contract to furnish gas and electric service at stipulated rates, made with the city, is based on sufficient consideration, if made in consideration of the city dismissing litigation by the city against the company. A gas and electric service company, which entered into a contract with the mayor of the city to furnish service at certain rates in consideration of his dismissing a suit against the company, and which furnished service at those rates for a number of years, was thereafter estopped to deny the validity of the contract on the ground that it was ultra vires as to the city.—Wackenhut vs. Empire Gas & Electric Co., Supreme Court of New York, 166 New York Supplement, 29.

Charge for Gas Furnished To Public Schools.

The board of education and the gas company entered into a contract under which the board of education installed a system of heating by natural gas in the public schools, and the gas company furnished natural gas to the board for heating purposes at a certain rate and maintained that rate for a considerable period of time. Thereafter the rate was changed to a different and higher rate at the request of the supply company from whom the local company obtained the gas and because the rate furnished to the board of education was discriminatory as compared with rates charged to other consumers, and not because the rate granted to the board of education deprived the gas company of a just return upon its investment. Held, that the evidence showing these facts was sufficient to justify an order by the corporation commission requiring a rate to the board of education different from and less than that charged by the gas company in the absence of a showing that said rate fixed by the commission, in connection with the rates charged to other consumers, deprived the gas company of a just return upon its investment.—Guthrie Gas, Light, Fuel & Improvement Co. vs. Board of Education of Guthrie, Supreme Court of Oklahoma, 166 Pacific, 128.

Liability for Injuries from Explosion.

Where a gas company, whose pipes conveying Pintsch gas passed along and under the banquette in front of a cold storage plant, was notified, several hours before an explosion, of a strong odor of gas pervading the cold storage plant, and requested to have an immediate investigation made, it should have done so, and its failure in that respect was negligence, as gas companies are held to a very high degree of care.—Feely vs. National Packing Co., Supreme Court of Louisiana, 75 Southern, 837.

Decision in Regard to Giving Different Rates.

Contracts of a public utility giving a consumer a special rate are void under the Montana statute unless approved by the commission. A gas utility having a schedule of domestic, commercial, and industrial rates was directed to graduate its rates upon the basis of the amount of gas consumed monthly through a single meter serving one consumer, to eliminate discrimination caused by arbitrary classification of consumers. Hanson vs. Havre Natural Gas Co. Docket No. 562, Report & Order No 179, Dec. 20, 1916.

Change of Gas Rates.—Validity of Contract.

The suit recently decided by the United States District Court for the District of Kansas, 241 Federal —, while involving among other things the validity of the contract under which the Kansas Natural Gas Co. and the Olathe Gas Co. have for several years been supplying the customers of the latter company, has not yet resulted in any decision as to the validity of such contract, jurisdiction having been expressly reserved over the issues involved which are not covered by the recent decision. Held, that a writ requiring the defendant companies to continue according to the terms of the contract until such contract be duly and legally set aside or superseded will issue unless within a time named such consent to depart from the terms thereof be obtained from the public utilities commission. Notwithstanding the decision in the federal case referred to touching the interstate character of the business conducted by the receiver, we adhere to the decision in State ex rel. vs. Flannelly, 96 Kansas, 372, 152 Pacific 22, that when selling natural gas to consumers thereof in this state the receiver is not engaged in interstate commerce.—Bristow vs. Landon, Supreme Court of Kansas, 165 Pacific, 1111.

Protecting Mains During Sewer Construction.

A gas company could not recover from a city contractor a charge for patrolling the streets in which defendants were constructing a sewer, and by whose negligence gas mains were injured, since, although defendants performed their work with care, plaintiff was chargeable with the duty of patrol and inspection. It is the duty of a gas company to protect residents and property owners from damage arising from the escape of gas caused by sewer construction interfering with gas mains.—Portland Gas & Coke Co. vs. Giebisch, Supreme Court of Oregon, 165 Pacific, 1004.

New Plant Assured by East Idaho Co.

The East Idaho Gas Co. announces that it has bought eight acres and will proceed with the construction of a gas plant as rapidly as possible. Owing to the demand for labor in the harvest fields this fall it is not probable that a great deal of the excavation work for pipe laying will begin much before spring. A great deal of the necessary equipment is on the ground and the other necessary parts are waiting shipment. It is hoped to have the plant in operation by next summer.

Pacific Coast Men Meet

Twenty-Fifth Annual Convention at Santa Cruz Proves Highly Valuable to Membership—Papers and Entertainment Features — Officers Elected

By W. M. Henderson

The following officers and directors were elected by the Pacific Coast Gas Association at its annual meeting on September 20th, to serve during the ensuing year:

President—John D. Kuster, San Jose, Cal.

Vice-President—A. B. Day, Los Angeles.

Secretary - Treasurer — Henry Bostwick, San Francisco.

Directors—John A. Britton, Geo. P. Egleston, B. S. Pederson, D. J. Young, S. C. Bratton, F. S. Wade and L. B. Jones.

The quarter century mark has been reached and past in the life of the Pacific Coast Gas Association, which has just completed its annual session. This year the convention was held in the assembly room of the Casa del Rey at Santa Cruz, Calif., September 18 to 21. C. B. Babcock as president called the meeting to order and was ably assisted by Henry Bostwick secretary-treasurer in conducting it to a successful conclusion. Following the usual business of secretary announcements and standing committee reports, President Babock launched into his address, discussing the current events that confront the gas man and presented them so clearly that gas men all will profit by heeding president Babcock's remarks. His original thoughts are not radical, but progressive ideas full of jazz.

Program of Papers.

A most excellent program of papers had been arranged for by Secretary Bostwick, covering most every phase of the industry. The subject of these papers and the members preparing them were as follows:

Who's Who—The Public, Rate Fixing Bodies, Rates or the Company—J. M. Berkley.

Hotel and Restaurant Fuel Sales—W. E. Dugdell.

Scientific Effect of the Use of Natural Gas, and the Use of Mixed Gas on Consuming Devices—Frank S. Honberger.

Early History of the Development of Oil Gas—L. P. Lowe.

Radiant Heat—Fred Champion.

Advertising Gas Through Appliance—A. L. Crane.

Systematic Salesmanship—Geo. P. Egleston.

Eliminating Waste—A. B. Day.

Can Profit Sharing with Employes Be Successfully Worked Out—On What Lines and Where?—R. H. Ballard.

Natural Gas—A. B. Macbeth.

Gas Heating Systems—M. L. Neely.

John D. Kuster, New President.

Gas Measurement—B. G. Williams.

Standard Flanges for Flanged Pipes, Valves and Fittings—J. P. Baloun.

Some Notes on the Industrial Use of Gas in England—Robert W. A. Brewer.

A Study of Efficiency and Utilization of Gas in Top Burners—Prof. Charles Norman Cross.

Discussion was lively on papers of a commercial nature which but illustrates the forward steps being taken by the men in the gas industry. It is an indication gas men recognize that the real stimulant of the business is through its sales organization.

Capt. Brewer on Industrial Gas.

It was a most welcome treat to the members to have the opportunity to entertain Capt. Robert W. A. Brewer, of the British Army, now stationed on the coast as a resident engineer, for his government, inspecting "tanks" being constructed in coast manufacturing plants. Capt. Brewer is a recognized authority on gas and gasoline engines and his contribution to the program of papers dealing with industrial uses of gas in England is most valuable at this moment.

Prof. C. N. Cross, of the Stanford University, who during the past year has had occasion to conduct numerous tests on the efficiency of various artificial gases of different B t. u. content and chemical analysis, prepared a paper on this subject. As E. C. Jones, L. B. Jones and Van E. Britton had co-operated with Prof. Cross in his tests there was a most interesting discussion of the deductions obtained. This work at the present time is highly valuable and of real service to the appliance manufacturer. At this time when so much discussion is going on relative to reduction in B t. u. value of domestic gas, it is most timely to have the work of Prof. Cross to aid in the proper settlement of this problem.

W. E. Dugdell's paper, Hotel and Restaurant Fuel Sales, created considerable interest that contributed to constructive discussion. Mr. Dugdell is a success in his line, and possesses a personality that simply sells itself. He put this same "stuff" in his paper and it commanded the attention of the members to the extent that he sold them his ideas. More salesmen like Mr. Dugdell should be drafted into the service of the gas industry.

The paper of A. L. Crane on "Advertising through Gas Appliances," seemed innocent enough from its title, but it created more difference of opinion than any other subject brought up before the meeting. This paper really deals with the subject of the sale of gas appliances either by the gas company or the surrender of such business to dealers. There seems no hope of arbitrating this point and the subject will have to work out its own salvation. Mr. Crane is a dealer and made a most convincing and able argument in favor of exclusively handling the sale of appliances. He won among the gas men numerous sympathizers but there were plenty of the old guard to stand by the interests of the gas companies to make this subject the most hotly contested topic presented.

During the four days that the convention was in session an appliance

display was held in the Casino under the direct charge of B. S. Pedersen as chairman of the committee. Mr. Pedersen can take credit for presenting one of the best displays of gas equipment that the association has ever held. The exhibitors occuping space consisted of: H. Mueller Mfg. Co., Decatur, Ill.; Comstock-Castle Stove Co., Quincy, Ill.; General Gas Light Co., Kalamazoo; Davis-Bournonville Co., Jersey City; Eriez Stove & Mfg. Co., Erie, Pa.; New Method Stove Co., Mansfield, O.; Michigan Stove Co., Detroit; National Stove Co., Lorain, O.; New Process Stove Co., Cleveland; Ringen Stove Co., St. Louis; Dangler Stove Co., Cleveland; Reliable Stove Co., Cleveland; Geo. M. Clark Co., Chicago; James Graham Mfg. Co., San Francisco; Eclipse Stove Co., Rockford, Ill.; Ruud Mfg. Co., Pittsburgh; Hoffman Heater, Lorain, O.; Pittsburg Water Heater Co., Pittsburgh; Humphrey Co., Kalamazoo, Mich.; Sprague Meter Co., Bridgeport, Conn.; Foxboro Co., Foxboro, Mass.; James B. Clow, Chicago; Welsbach Co., Gloucester, N. J.; A. B. Stove Co., Battle Creek, Mich.; Pacific Meter Co., San Francisco; International Hale Gas Mixer Co., Providence, R. I.; Bairde-Bailhache Co., San Francisco; D. H. McCorkle Mfg. Co., Oakland, Calif.; Peerless Heater Co., Los Angles; Pittsburgh Meter Co.; Jack Martin Co., Oakland, Calif; R. H. Reardon, San Francisco.

Baking Demonstrations.

Each day cooking and baking contests were conducted by Miss J. Brown with a class from a local domestic science department in the high school. In the evening the results of the day's bake was auctioned off for the benefit of the Red Cross. Many dollars rolled in to a good cause in this way. The young girls should value their services high for many a loaf of bread brought $5.00 to $10.00.

Entertainment Features.

The entertainment on one evening was of a distinctly high order. L. P. Lowe, of San Francisco, exhibited some beautiful autochrome pictures of the 1915 exposition, Yosemite and still life. Mrs. E. W. Florence and H. R. Bossford sang to the delight of the assembly, following which all adjourned to a dance in the Casino ball room. A grand ball was on the program for the following evening followed on the last night by a banquet and theater party. The ladies were wonderfully entertained, every convenience possible being provided for them by Van E. Britton, chairman of the entertainment committee. The local public service company provided free use of all its sources of entertainment, including surf bathing, which was amply patronized. Golf, cards and auto trips were at the disposal of all members who enjoyed such sports.

At the conclusion of the business session the association selected Los Angeles, Calif., as the place of meeting for 1918.

Capt. Robert W. A. Brewer was elected to honorary membership. Seventy-seven new active members were taken into the association this year and four associate members were secured by the good work of Chairman S. C. Bratton and his men on the membership committee.

Babcock's Address

The years that have passed since the first meeting of our association in July, 1893, in the office of the old San Francisco Gas Light Co., are years of successful effort, said President C. B. Babcock, replete with history-making significance to the gas industry—a transitory stage from the age of coal to oil. The development of oil gas, the organization of scattered enterprises into a few units of economic strength and service, the widening of our field of endeavor, the final recognition and partial application of modern sales methods in the operation of our business have occurred since the organization of our association. Among the most important needs of our business on the Pacific Coast are larger activity and greater genius in the Commercial or Sales Department. All departments of the industry have their places of responsibility, but upon no department devolves a greater duty than that of the Sales. There is the heart of the business—whose every strong pulsation means greater strength, greater progress, wider use and greater service to mankind. All praise to the man who makes the product, but greater praise to him who successfully markets it. To make the product, to distribute it, is not sufficient, we must sell it if we are to progress. I hope to see the day when the manufacturing department of our business will be hard pressed to supply the demand created by the Sales Department. The modern successful Sales Manager is a keen, farsighted executive, open to new ideas; not the type of man who quails in the face of a living thought or new idea. We must put into practice the best and most modern sales methods of the eastern utilities coupled with our own initiative and originality. I believe the most successful manager of a gas company is more of a Salesman than an Engineer. Never before in the history of our business have we stood face to face with affairs of greater moment for largely upon our industry depends the success of our armies in the field. In the gas plants of our country, in large measure, will be fought the decisive battles of the war. Our by-products are an absolute necessity in keeping those great guns forever in action until the day when, backed by American men and their Allies, we shall have for all time settled the almighty controversy between Autocracy—the ideal of criminal, lawless, might—and Democracy—the ideal of free-born men, respectors of decent laws and the right to live in peace, happiness and comity with our neighbors. Great indeed is that industry which performs so high a service—a service to all mankind—in time of war; in time of peace.

Eliminate Waste; Increase Utilization —the Gasman's Motto.

Our lives these days are being regulated along new channels. We must practice economy; waste must be stopped. But while waste is a bad thing, false economy is worse. It is just as important and patriotic to keep business moving; to produce and distribute goods, as it is to shoulder a rifle or make ammunition. There must be men behind the lines to keep the soldier supplied with necessities. Our business is now more complex than in the earlier days. The necessity of wide dissemination of information is of paramount importance and so it is necessary for the future progress and welfare of our business that the young men begin where the older men left off. More thought should be given to the recovery of by-products. Not alone as a war measure, but for commercial purposes. If the operating company does not have time to devote to research work, then the aid of our universities should be enlisted and as an incentive to them, a royalty offered for any successful work they may do which proves of commercial value. The University of Kansas has done a great deal of splendid research work along these lines and has been of inestimable value to manufacturing concerns in various lines of business.

Every dollar's worth of gas used these times means aid in a superlative degree to our country. Every thousand cubic feet of gas made and sold means many more ounces of chemicals produced, which is necessary to the winning of the war. Not only as to chemicals produced but as the most economical way to utilize oil or coal, the nation looks to gas. Surely this fact should be an inspiration to the executive, the engineer, the salesman. He truly is doing "his bit" at home who increases the sale of gas.

Opportunities for Development Along Present Mains.

Last year, at our meeting, one of our ablest young men hurled at us the fact that the Pacific Coast is far behind other parts of the country in the sale of gas lighting. I go farther and say we are far behind in its sale for every purpose. This condition may be remedied by intelligent sales distribution, for with our favorable climatic conditions and comparatively low cost per thousand cubic feet of gas, we should easily be in the forefront with

(*Continued on Page* 203)

Coast Wrinkles

A Few of the Practical Suggestions Made to Pacific Gas Association

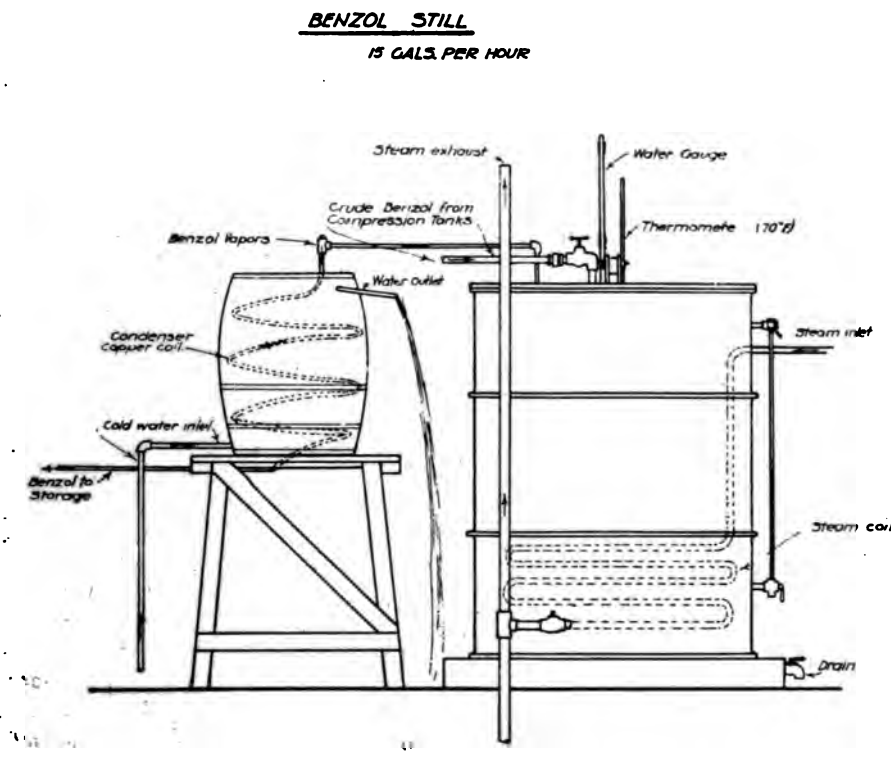
Some interesting and valuable wrinkles were submitted at the annual meeting of the Pacific Coast Gas Association held at Santa Cruz, Sept. 18-21. This feature was under the direction of D. J. Young, editor of the wrinkle department. Several of the ideas follow:

Apparatus for Charging Benzol.

Austin Rix, of the Pacific Gas & Electric Co., San Rafael, Calif., submitted a wrinkle showing apparatus for clarifying benzol. The material used follows: Old oil drum, half wooden barrel, copper coil from old gas tank heater, gauge glass and fittings from old boiler water column, thermometer and gauge only used until flow is regulated.

Emergency Repairs to Web Meter.

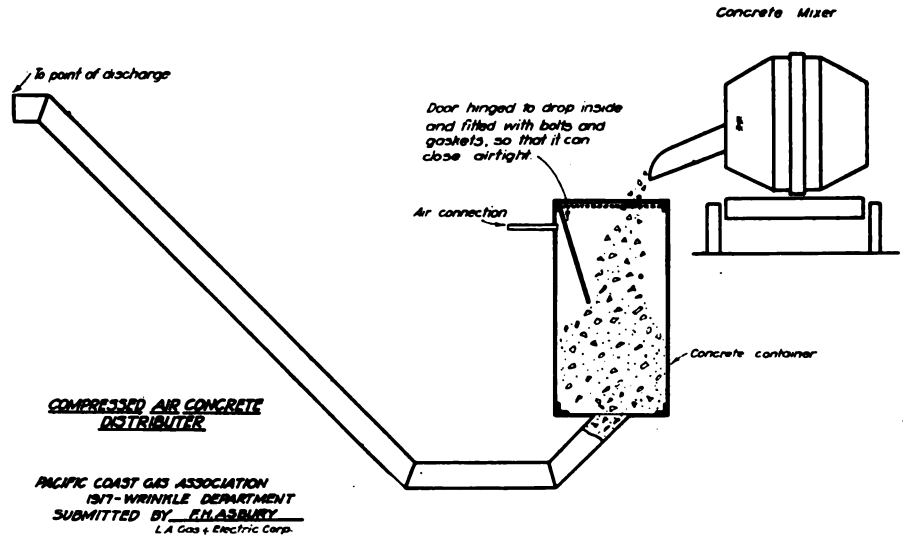
E. S. Jones, superintendent gas works, Pacific Gas & Electric Co., submitted the following experience: One morning the storage holder drips began to fill up faster than we could pump them out. The trouble was located in the dry well of the 16 foot station meter. This elbow, which is tinned sheet iron coated in and out with lead, had been scratched in countless places during the reconstruction of this meter exposing the iron surface. The two metals, lead and iron, in the water, was enough to set up an electrolytic action, which eventually caused a hole at each scratched place. Repairs in the original form were out of the question, and a new dry well meant a considerable expense. The elbow was given a heavy coat of home-made tar paint and closely wrapped with heavy 8" bandage cotton. Another coat of tar paint and more bandage and the elbow was found to be absolutely tight to gas and water, and has continued so now for over two years.



Apparatus Suggested by Austin Rix for Clarifying Benzol.

Air for Pouring Concrete.

The following wrinkles were submitted by F. H. Asbury, of the Los Angeles Gas & Electric Corp., Los Angeles. Pouring concrete into elevated or inaccessible forms, where compressed air is available: Directly under the discharge of the concrete mixer, place an iron receptacle, made from a piece of second-hand pipe, old steam separator, or any other material of light construction that may be available, sufficiently strong to stand the pressure maintained on the air receiver.



Compressed Air Concrete Distributor.

This receptacle should be of sufficient size to hold one charge from the concrete mixer. Hinge a door on the top with a gasket placed so as to set against the flange when the door is closed (as shown in the accompanying sketch). Near the top, just under the door, tap into the container for the air line. From bottom of container run a 6 inch pipe to point where discharge is desired. Eliminate right angle turns. Use two 45° ells where it is desired to make a 90° turn. When the charge from the mixer is in the container, pull up the door and turn on the air, which will in turn discharge the mixed concrete into the forms; after which, turn off the air and repeat the operation. Best results will be obtained if the mixture of concrete is mushy.

Pumping Oil in Cold Weather.

J. W. Coons, Manager Yolo district, Pacific Gas & Electric Co., Woodland, Calif., suggested a method for pumping oil in cold weather. During cold weather, said Mr. Coons, we experienced considerable difficulty in pumping oil from the railroad spur to the gas works through about a quarter of a mile of 4" pipe. In order to cut down the pipe friction, a valve was placed on the intake of the pump, so that a certain quantity of air was admitted with the oil. This reduced the volume of oil in the pipes and the friction enough so that the pump could handle the oil without excessive pressure. This device saved the installation of a steam boiler to heat the oil.

ELIMINATING WASTE.

A Few Practical Suggestions for Increased Efficiency in Gas Plant Operation.

It is doubtful if a better field for the application of modern methods for the elimination of waste is available than the various branches of the gas industry, declared A. B. Day in a paper at the annual meeting of the Pacific Coast Gas Association on September 18 to 21. Strict regulation by governmental commissions, the constantly increasing price of commodities. the tendency toward lower rates. together with the character of the work to be performed, make it necessary to be on the alert for improved ideas.

Waste of Material.

By waste of material is meant those items which are necessary to keep the various branches of the mechanical departments in repair, such as piping, fittings, machinery, etc. In all probability there are many instances of materials being thrown away in many of our organizations which, if saved, could be disposed of at a profit. For illustration: Scrap leather which accumulates from cutting meter diaphragms, and which formerly was destroyed, can now be disposed of to good advantage. Many other junk materials now command a price which makes them worth saving. Another way of eliminating waste of material is in careful inspection work. This should be done by a working foreman or inspector and should include all classes of work performed. It is not necessary that an inspection of each job be made, but a sufficient number should be checked to insure good work. To eliminate waste of material the purchasing department was established. All materials should be purchased through this department, and it should be the aim to buy the best possible materials for the least money. The purchasing agent should be furnished by the management with a set of standards for his guidance and he should not deviate from them unless for good and sufficient reason. Where much blacksmithing is done a material saving can be made by the substitution of oil for coal. Oil furnaces are inexpensive and may be made in any shape needed—often from scrap material which has been junked. The installation of oil separators and waste-washing machines in the engine room are well worth the necessary investment, and since the cost of oil and waste have increased so greatly the saving in money is considerable. Another item which will prevent waste in the engine room is the substitution of cup grease for oil. There are many cases where grease will lubricate a bearing as well as oil and at a very much lower cost; also a saving of time required in filling oil cups is accomplished.

Waste of Labor.

Waste of labor is the most important subject to be considered and it is very perplexing to solve on account of the impossibility of watching each worker; this being especially true in large organizations. Men should be trained to know how to employ their time to advantage and be made to realize that their positions depend upon an honest day's work, and that loafing or "killing time" will not be tolerated. A few practical suggestions are given which will eliminate waste of labor and which it is hoped will be of some general benefit:

When it is necessary to sharpen a large number of picks or gads, it has been found that a small power hammer will enable the blacksmith to turn out approximately 100 per cent more work, as well as eliminate the necessity of a helper. The installation of conveyors for handling by-products, and portable cranes for loading or unloading pipe and large fittings will reduce the amount of labor required. Metermen and others doing outside work should telephone to the shop on completion of a job to receive additional orders for work in close proximity to the work they have completed. This will save much time. It has been found that a saving of labor can be made by furnishing each repair man with a kit of standard tools needed in the work he is to perform, and a suitable box or chest in which to keep them. A card system should be installed on which to record storeroom stock. By this method, the amount of material on hand is known, and is very useful in taking and checking inventories. Much benefit is derived from the use of billing machines. The use of an adding machine in the totalling of ledgers shows a material saving over the time required to do this work by bookkeepers. A saving of time and money can be effected by the installation of a printing press and paper cutting machine. Quite often an amount of time is consumed by meter readers in checking statements which appear to be erroneous. By attaching a reread order to the bill, thereby calling attention of the collector to the possible error, he may make such reread and adustment as is required at the time the bill is presented for payment. By careful routing and continuous checking of routes much time may be saved by collectors. The collectors themselves usually are best qualified to make such changes and suggestions as will reduce the amount of time required to perform their work.

Transportation Waste.

In the elimination of transportation waste, consideration should be given to the routing of cars used to transport men and material; this is especially true in a city where streets are irregular. When it is necessary to work in outlying districts, the shortest route to a given point should be ascertained by the foreman and the men given instructions to follow it. It should be insisted that when a car is not in motion the engine be idle. Often an employee will stop for a short time and allow the engine to continue running, causing a needless waste. A mileage standard should be adopted and a check kept upon the gasoline consumption of each car. When a driver fails to keep up to or above the standard established an investigation should be made to ascertain the cause. It is quite important that a standard make of car be adopted for the various kinds of work to be performed. When a large number of the same make cars are in use, the repair men become expert at their work, thereby saving time; this also warrants repair parts being carried in stock.

ATTITUDE CHANGING.

Public Now Recognizing Value of Fairness in Public Utility Matters.

In summing up the whole matter of "Who's Who?," declared J. M. Berkley, gas engineer in a paper before the Pacific Coast Gas Association, September 18-21, it is quite clear that it is not the rate fixing bodies, whose principle function is to establish rates that will produce sufficient revenue to maintain the property, and at the same time see that service is rendered at the minimum of cost to the consumer; nor is it rates, whose functions are to provide revenue sufficient to maintain the property and guarantee a fair return on the investment; nor is it the company, whose rights are only those granted it, having no creative power of its own, it can only exist within the limits of privileges granted, and on whom falls all the burdens of service, for the privilege of serving. It is quite evident that "Who's Who?" is the public, that invisible something that possesses power to grant or withhold privileges, make laws, govern operations, make demands and maintains a position of innocence if found convenient.

There is, however, consolation to be found in present-day tendencies, viz: the public is now recognizing that with all its power, it is better to be mutually just in its decisions rather than arbitrary in its judgments—great or good coming to a greater number than in times past when former undesirable policies prevailed—therefore, let us look for the coming of a brighter future as we continue to work out our destinies as those who serve.

Italian Company Wants Coal Tar or Gas Coal Pitch.

Item 25340 in the Daily Commerce Reports of September 10th, says a company in Italy wishes to purchase coal tar, or gas coal pitch in large quantities. This product is the refuse obtained from distilling coal for gas manufacturing, and should be dried. For payment, credit will be opened in American bank. The tar or pitch should be shipped loose and preferably "in ballast." Correspondence may be in English. References exchanged. For full particulars address the Bureau of Foreign and Domestic Commerce at either Washington, D. C., or Federal Bldg., Chicago.

Thomas Gibson, for 40 years an employe of the Baltimore Consolidated Gas & Electric Co., was retired August 1st.

A. E. Inglesh, formerly new business manager of the Quincy (Ill.) Gas, Electric & Heating Co., now is with the quartermaster's corps at Camp Logan, Houston, Tex.

The gross earnings of Doherty's Cities Service Co. for the twelve months ended August 31, 1917, were $17,296,943, or 2½ times greater than for the twelve months ended August 31, 1916. The balance for the common stock, $13,550,718, was three times greater.

Benzol and Toluol Recovery

Outline of Experiment Made on Scrubbing Carburetted Water Gas Presented in Paper at Meeting of American Chemical Society at Boston

By Robert J. Moore and Gustav Egloff

Considerable prominence has recently been given to the discussion of scrubbing carburetted water gas with a view to combating the shortage of toluene and benzene. The report, dated July 20, of Dr. W. H. Nichols, chairman of the Committee on Chemicals of the Council of National Defense, emphasizes the toluene shortage, and says that "efforts are going to be made immediately to increase this supply by 'stripping' the gas in large cities." In view of these facts the writers are of the opinion that the following experiment in scrubbing a representative water gas will be of interest.

Experimental.

The carburetted water gas fresh from superheater was measured by passing through a dry meter and thence into an 18-inch diameter pipe 10 feet in height. In this pipe 25 gallons of technical paraffin straw oil was utilized for the scrubbing of the gas, which passed below the surface of the oil through a rose. As the gas passed through, the oil was circulated by means of a pump and sprayed over a series of lattice woodwork set within the pipe by means of supports. This circulation and spraying of the scrubbing oil facilitated the solution of the light oil molecules in the gas. Above the scrubber a condenser coil and box was placed so as to minimize the scrubbing oil losses.

Twenty-five gallons of straw oil were used in a charge. When 1,000 cubic feet of gas had passed through the system, the benzolized oil was transferred to a one-barrel still (42 gallons capacity), with adequate steam and condensing arrangements. This oil was steam and gentle direct-fire distilled until a temperature of 175 deg. to 180 deg. C. was reached in the oil vapor line. At this temperature practically all of the light oil distilled off. This fact was carefully checked by analysis of the original straw oil and the debenzolized straw oil as shown in Tables 1 and 2.

Table 1—Analysis of Original Straw Oil.
Distillations in standard Engler 100 c.c. flask at rate of 2 drops per second.
Specific gravity 0.848/15.5 deg. C.

Temperature Deg. C	Per Cent. by Volume	Specific Gravity 15.5 Deg. C.
310	1st drop	.....
310 to 325	6.1	0.829
325 to 350	60.4	0.845
350 to 375	21.5	0.852
375 to 392	8.0	0.854
392 cracking	.....	.....

Table 2—Analysis of Oil After Steam Distillation.
Specific gravity 0.628/15.5 Deg. C.

Temperature Deg. C	Per Cent. by Volume	Specific Gravity 15.5 Deg. C.
306	1st drop	.....
306 to 325	9.7	0.833
325 to 350	55.0	0.844
350 to 375	18.7	0.851
375 to 389	10.0	0.855
389 cracking	.....	.....

Comparing Tables 1 and 2 no greater variation is found than one usually finds in oil distillation by the Engler method, showing that all the light oil present after the scrubbing was removed by the steam and direct-fire distillation. Some loss of the straw oil occurred in operation, but all the light oil was recovered, as far as practicable, the conditions of the experiment approximating plant conditions.

Light Oil Recovered.

The light oil recovered was 1.211 liters (0.32 gallon) per 1000 cubic feet of carburetted water gas washed. This oil was yellow and had the characteristic odor of a cracked oil. Its unsaturated content was high, 35 per cent. combining with 1.84 specific gravity sulphuric acid. Due to this high percentage it was necessary to control the velocity of sulphonation by cooling to zero degrees due to the considerable heat generated by the interaction in order to avoid loss of aromatics, either by evaporation or by combination at higher temperatures. The analysis of the light oil is given in Table 3.

In the above table the 6 to 7 per cent. distilling at the higher temperatures is probably due to straw oil carried over during steam distillation.

The per cent by volume of the benzene, toluene and xylene cuts from the light oil are given in table 4, together with the gravities and also the amounts of unsaturateds in each cut.

Table 3—Distillation Analysis of Light Oil.
Specific gravity 0.868/15.5 Deg. C.

Temperature Deg. C	Per Cent. by Volume	Specific Gravity
39	1st drop	.....
39 to 75	3.8	.....
75 to 100	55.2	0.867
100 to 125	24.9	0.869
125 to 150	5.9	0.868
150 to 175	1.0	.....
175 to 200	0.8	.....
200 to 225	1.1	.....
225 to 250	0.1	.....
250 to 300	0.7	.....
300 to 325	1.4	.....
325 to 350	4.0	0.831
Residue	1.0	.....
Loss	0.5	.....

In the above table the 6 to 7 per cent. distilling at the higher temperatures is probably due to straw oil carried over during steam distillation.

Table 4—Percentage of Benzene, Toluene and Xylene Cuts and Unsaturateds in These Cuts.

Cut, Deg. C.	Per Cent. by Volume	Specific Gravity	Per Cent. of Unsaturated
Benzene (to 95)	51.8	0.866	46.0
Toluene (95 to 120)	24.1	0.869	18.0
Xylene (120 to 150)	6.0	0.868	24.0

This high per cent. of olefins (Table 4) formed in carburetted water gas as manufactured in the standard plants today would naturally be a retarding influence on the success of the scrubbing process, involving as it does a complicated low-temperature washing system and purifying of the aromatic with the losses attendant thereto. Therefore it may be feasible to adopt certain modifications in the water gas works with a view to decreasing the percentage of olefins formed. There has been much research along these lines, but little actual installation. The method of admixing to the blue water gas, hydrogen gas in order to decrease unsaturation has been shown by Whitaker and Leslie to be of little use so far as the above problem is concerned, since their work indicates that low molecular weight olefins are not hydrogenated to any extent. Whitaker and Rittman show the results of gas making under increased and decreased pressure, while Egloff and Twomey find that cracking a gas oil at higher temperatures than usual effects a decrease in the per cent. of olefins and increases the aromatic formation. It seems to the authors that in view of the necessity of obtaining toluene and benzene in larger quantities than now possible certain changes may be advisedly made in the water-gas machine involving either temperature, pressure or admixed gases so as to increase the yield of the above-mentioned by-products. Carrying out the preparation of the blue water gas independently of the cracking of the oil in the carburetor and mixing these products later may be a solution of the problem. Since the carburetor then is in a separate system, either increased or decreased pressure may be used in cracking as desired. Such changes may be feasible in view of the propaganda to change the gas standard from an iluminating basis to a heat unit. Or the benzene fraction with its high olefin content may be returned to the gas depriving the latter of only its toluene and xylene.

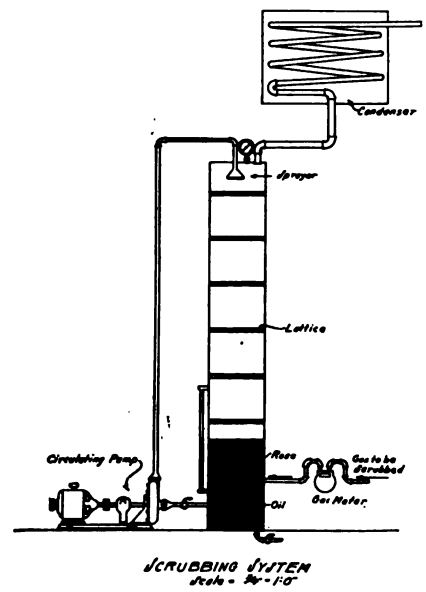
Aromatics From the Light Oil.

To determine the precentage yields of benzene, toluene and xylene actually obtainable from the light oil obtained by scrubbing, one liter was carefully treated with sulphuric acid, neutralized with sodium hydroxide, washed with water and dried over fused calcium chloride. This dried oil was distilled in an efficient fractionating column and analyzed. The results were as follows:

	Per cent. by Volume
Benzene	22.1
Toluene	20.0
Xylene	5.1

Aromatics From 1,000 Cu. Ft. of Gas.

Since the volume of light oil recovered from 1,000 cubic feet of carburetted water gas was 1.211 liters, or 0.32 gallon, and the percentages of benzene, toluene and xylene are as given above, the volumes of these aromatics per 1,000 cubic feet of gas are given in Table 5.



For Stripping Oil From Water Gas.

Table 5—Benzene, Toluene and Xylene Recoverable From 1000 Cubic Feet of Gas.

	Liters	Gallons
Benzene	0.267	0.0707
Toluene	0.242	0.0640
Xylene	0.062	0.0163

In view of the fact that the annual production of carburetted water gas is in the neighborhood of 150 billion cubic feet the above figures are significant.

MUST RAISE RATES.

Natural Gas Men To Meet in Cincinnati for Conference on Rate Advances.

Representatives of the natural gas companies will meet in Cincinnati in the near future to consider how to meet the demands for natural gas expected this winter and to discuss the rate question, which directly affects production. Gas shortage is being feared in Pittsburgh and elsewhere owing to the refusal of state commissions to grant higher rates for gas. Increased cost of operation, it is claimed, is putting an unjust burden on the producers, and extensions cannot be made with present price levels for natural gas.

Rufus F. Dawes, member of Dawes Bros., of Chicago, who control and operate a number of natural gas companies in various parts of the United States, recently said:

"The average natural gas company must meet a 'peak load' problem that is a greater burden than that of any of the utilities, and accounts for the greatest of our troubles. In a large part of the natural gas territory communities have been taught to use gas in the household both for cooking and heating. Consequently, we have a load in the winter months of approximately six times the summer demand. Added to this is a greatly increased demand during certain hours of especially cold days. Consequently, there are times when the peak load is twenty times the minimum summer demand. However, the companies must provide pipes and capacity for the highest point of the peak. Much of this household demand is handled at a loss. Not only is gas actually delivered for nothing, but the service rendered shows a loss. In many communities the average household monthly bill is less than the cost of reading meters, collecting and providing service. An effort is being made to fix a minimum monthly rate of enough to cover service charges. The average might be 60 cents or it might be 70 cents. That being done, gas used in excess of the minimum could be delivered at a low rate with a fair profit to the company and at a fair price to consumer."

The Calumet Gas Co. Changes Ownership.

Shareholders of the Calumet (Mich.) Gas Co., have voted to sell the company's plant, business and other assets to Fred K. Guck, who, it is understood, represents a temporary organization of local interests. The price agreed upon was $70,000.

Catechism for the Meter Man

Questions and Answers Compiled for the Novice or Apprentice in the Gas Meter Repair Shop Which May Be Found Helpful for Reference

By Wm. H. Matlack

The following questions and answers which have been compiled by experienced meter repairmen may serve to help the novice or apprentice in the repair shop and freshen the memory of those men who find that doubling up during these war times is their lot.

How are meters that are rusty and dirty cleaned?

Meters brought into the shop in a dirty or rusty condition are washed with a strong solution of lye water. After solution is made up meters are set in the bath and soaked, care being used to see that water does not run into the channels. This lye solution will remove all grease and paint. Sometimes it is found necessary to use a wire hand brush, when the grease is very heavy. After the meters have been removed from the bath an oiled cloth (coal oil) is used to wipe them off. Do not use a power brush as it is likely to brush off the tin; a hand brush will do the work in all cases.

Having removed the top of the meter under what condition it is necessary to remove back plate?

Remove back plate when valves are gummed or whistle—when valves need cleaning. After removing back, mark valves if they are not already marked. This keeps them from being mixed as to sets.

Explain how valves are cleaned and reground.

Use powdered emery to regrind valves. Clean valves with a piece of soft cloth dipped in gasoline, wipe them all around. The inside of valve chambers should be treated the same way. Care should be used in the above operation. Use only enough gasoline to dampen the cloth in order that no gasoline goes down onto the diaphragms.

When do you resolder back plate on meter—before or after packing crank box?

Resolder back on meters before packing crank box. This is done in order to keep grease in the packing. It readily can be understood that if the back was soldered after the crank box had been packed the heat would melt all grease out of the packing.

At what pressure water column are diaphragms tested?

A "U" gage is used and diaphragms are tested to 15/10 water column.

Is leakage permissible?

No.

If leak is discovered how is it taken care of? How is the leak located?

Use water to locate the leak, care being taken to wipe water off when diaphragm is empty. If cords around diaphragm leak rub shellac out with wood alcohol; if seams on diaphragm leak use Hurnes wax melted with tallow one part each.

Why is water used?

Water is considered safer than gas.

Under what conditions is oil used on diaphragms?

When leather is dry. This is usually the state when meters are in service three or four years. A good oil to use on diaphragms is composed of equal parts sperm, rape seed and neats foot oil; sperm oil may be used if nothing else is available. Give all meters "in" test. Keep all meters to be tested in room with prover from 12 to 24 hours before making test.

How is meter test conducted?

When meters are to be tested they should have been in test room long enough to have attained "room temperature." The water in the tank should also be of the same temperature. Run at least two cubic feet of air through the meter before making test. Meters should then be tested open and for speed. If meter is found to be much out on first test give it second test for verification. A test consists of one complete revolution of the test (2-foot) hand. Meters on "in" test need only be tested on the check flow. Repaired meters should be tested on both check and open in order to determine whether or not tangent is O. K.

Do you connect meter up backwards, if so why?

Meter is connected up backwards in order to determine whether or not the tube screw has been punctured and to be sure that the body of the meter is tight.

Where are leaks usually found?

Leaks are usually found in the valves, channels or diaphragms.

When meter is tested on check flows what size check opening are used?

Use the following for 3 lt., ⅛ in.; 5 lt., 3/16-in.; 10 lt., ¼ in.; 20 lt., ⅜-in.; 30 lt., ½ in.; 45 lt., ⅝-in.; 60 lt., ¾-in.; 100 lt., ⅞-in. Some meter companies use a drill 1/64-in. smaller.

When is a meter turned over to state inspector?

This depends upon commissions' rules or city ordinance in some cities. The percentage permissible is usually two per cent. fast or slow.

Should valves be oiled?

In some cases it is well to use a very little vaseline on valves.

What is used for packing boxes?

Use 8-fold zephyr (yellow white) for packing boxes. Do not repack unless zephyr is stained and hard. When packing is soft and clean use very little oil on it, the oil best suited for packing being made up of kidney suet, 10 lbs. to one quart sperm oil and ½ lb. beeswax.

Are yarn or wool washers used for washers?

Either may be used; the wool washer may be packed quicker. Packing should be oiled before placing in boxes. Melt and dip yarn or wool into the hot grease, squeeze out until it seems almost dry.

Gas Consumption To Be Reduced in All Parts of Germany.

The London "Times" reports that there is great excitement in Berlin over the announcement of drastic restrictions of the consumption of gas. All over Germany the consumption of gas is to be reduced by 10 per cent. of the monthly consumption a year ago; but in Berlin new orders have been issued which are calculated to mean a reduction by one-half of the gas consumption of every ordinary household. It is long since any official order has been so bitterly attacked. The newspapers are full of violent articles and letters, which say that the situation next winter will be intolerable. The excitement has been increased by preliminary announcements of drastic measures to reduce the amount of coal used in "central heating" of all buildings. It is proposed that only a certain number of rooms in every house shall be heated; that there shall be no heating until a certain low temperature has been reached; and that many public buildings shall not be heated at all.

H. C. Schimpff has succeeded W. B. Miser as new-business manager of the Illinois Traction System at Peoria.

Steam Production

Practical Suggestions for Economy in Boiler Rooms of Gas Plants

The boiler room is the vital point of a steam plant and it may be possible to produce a considerable increase in economy with little or no initial expenditure, by improving the operating efficiency, says Gas of London.

Design of Furnace.

Boiler furnaces should be so designed as to give the maximum possible percentage of carbon dioxide with little or no carbon monoxide in the chimney gases. To do this they must provide sufficient combustion space to admit of bringing the volatile gases into intimate contact with the air supplied to the furnace before the gases reach the relative cool heating surfaces of the boiler. The efficiency of a furnace must be determined by systematic flue gas analysis work. Furnaces which are improperly designed must be modified to give the desired conditions. Air for combustion may be supplied in three ways, and the proper system to be chosen must be determined for each special case. Forced draught is to be preferred with small size anthracite, steam coal or coke, but natural draught is usually more economical for bituminous fuels. Forced draught may be preferred when it is desired to increase plant capacity. Boilers may often be operated to advantage at much greater capacities than those for which they are designed, but this usually means some loss of economy, and it is not advisable to operate boilers continuously much above their rating. When considering stack draught problems it must be remembered that intensity of draught is proportional to the stack height, while the gas capacity is dependent on the stack area. Mistakes are sometimes made in design due to a misunderstanding of the relation between area and height of stacks.

Causes of Low Efficiency.

The following are the main causes of loss in boiler efficiency and their remedies:

1. Carbonized heating surfaces — cleaning.
2. Scale on heating surfaces—water purification and cleaning.
3. Improper or leaky baffles—change in design or repairs.
4. Poor furnace design—change design or fuel.
5. Improper air distribution to fire—modify draught system or grates.
6. Improper regulation of quantity of air supplied to fire—proper regulation to be determined by flue gas analysis and draught gauges.
7. Leakage of cold air through settings, doors, etc.—test with candle flame and stop all leaks.
8. Leakage of steam and hot water from boiler and fittings—test for leaks at regular intervals and stop them as soon as found.
9. Loss of steam by blowing of safety valves—proper regulation of pressure.
10. Loss due to irregular supply of feed water—install regulators or force firemen to pay attention to feed regulation.
11. Loss due to radiation—if excessive, cover walls with insulating material.
12. Loss due to sifting of coal through grate—if excessive, decrease size of air openings.
13. Losses due to improper stoking of coal and working of fires—careful training of the firemen as to the best method of handling the coal supplied, and constant supervision to see that they carry out instructions.

Determining Efficiency.

Coal should be accurately weighed if economy of operation is to be maintained. Feed water should also be carefully weighed or measured and daily records should be kept of the boiler efficiency obtained. Care must be taken to see that weighing devices are accurate and losses are accounted for. Steam meters, draught gauges, pressure gauges, moisture determinations, pyrometers and flue gas analysis instruments are all desirable in boiler plants which are to operate with the best efficiency. Feed water regulators are of slight economic value, but will correct trouble due to poor hand feed regulation, and will usually increase safety of operation. Damper regulators are of doubtful economic value, but are an advantage for accurate pressure control with fluctuating loads.

Economy in Steam Consumption.

Most of the steam produced in gas works is used by the engines driving various kinds of machinery, by pumps, or in the processes auxiliary to the water gas plant. Water gas generators often use steam 1.50 per cent. in excess of the amount theoretically required. It seems probable that this excess can be reduced by improvement in the method of distribution of steam to the fires. Gas works machinery may be driven by many types of engines and the type best suited to the work to be done must be carefully selected. Engines must be regularly inspected if they are to be kept in condition to operate with the best economy. Certain simple tests will show their internal condition

Steam pumps are usually uneconomical and must be given constant attention, especially at the water ends. Some new type of valve and valve seats have been put on the market which have helped to increase pump efficiency. Losses due to steam leakage can be reduced by systematic inspections for steam leaks. Exhaust steam is now being used for heating systems, in exhaust turbines, for the production of electric power, and in the process of water gas manufacture, replacing live steam for this purpose. By collecting and utilizing all available exhaust steam in excess of that needed for heating feed water, it may be possible to effect a considerable saving in live steam consumption.

Mechanical stokers will prove more economical than hand-fired grates in many cases, because they reduce the amount of manual labor required in the boiler room and allow the men to give more time to maintaining proper furnace conditions. They usually give more nearly smokeless combustion, some reduction in labor cost and better economy at high ratings.—*Gas of London.*

A New Briquetting Machine of Medium Size Perfected.

A briquetting machine recently was placed on the market by the Excelsior Tool & Machine Co., of East St. Louis, Ill., which produces a 5½-ounce briquette at the rate of 150 tons in 10 hours at 8 revolutions per minute. The builder states that any kind of coal may be briquetted, provided the proper binder is used. The coal is crushed and passed over a screen to which magnets are attached which remove the iron and other metallic foreign substances from the coal. The mixture is then combined with pitch or some other substance and automatically fed into the mixing machine. Twelve jets of superheated steam are forced through the mixture which binds the mass into a fluxed plastic substance which is fed through the lower gate directly into the mold and formed into briquettes which fall on the conveyor belt below.

The Detroit offices of the Davis-Bournonville Co. have been moved to 427 Grand River Ave., owing to the expansion of business and for the greater convenience of the trade. A complete stock of apparatus and welding supplies will be maintained at the new address, together with a large demonstration shop. J. R. Wilson is district sales manager for this territory.

Proper Combustion Mixtures

Abstract of Recent Government Paper on the Limits of Complete Inflammability of Mixtures of Mine Gases and Industrial Gases With Air

By Geo. A. Burrell and Alfred W. Gauger

This report summarizes the results of numerous experiments to determine the limits of inflammability of mixtures of mine gases and of industrial gases with air. The most important results of the inflammability experiments are shown in Fig. 1. The data are of importance in relation to the occurrence of inflammable gases in mines and to the industrial use of such gases. The gases investigated were gasoline vapor, ethane, methane, natural gas, acetylene, artificial illuminating gas, hydrogen, carbon monoxide, and blast-furnace gas. Vast quantities of gasoline vapor, natural gas, acetylene, artificial illuminating gas, blast-furnace gas and hydrogen are being utilized for industrial purposes. Methane, hydrogen and carbon monoxide are found in mines. Methane and ethane are constituents of natural gas.

Flame is said to be self-propagated through a mixture of combustible gas and air, or of combustible gas, and oxygen, when enough of the combustible gas is present to permit combustion to spread through the mixture from any given point of ignition. Then propagation of flame takes place from layer to layer of the mixture without the continued presence of the source of heat that started the inflammation. The conditions of experiment affect to some degree the limits of complete propagation. For instance, with mixtures of gasoline vapor and air, the low limit was 1.5 per cent. when a mixture of vapor and air was ignited from the bottom upward and 2 per cent. when ignition was made from the top downward. With methane, the limit was 5.50 per cent. for horizontal propagation of flame and about 5 per cent. when ignition was made from the bottom upward. In coal mines, where methane is found, the limits for horizontal propagation are the most important. In general, the limits are slightly lower when ignition occurs from the bottom upward than when it occurs from the top downward. In some of the experiments a glass vessel having a capacity of 2,800 c.c. was used as the container for the gases tested. Two copper wires entered through the sides and met at the center of the vessel. A current of 5 amperes at 15 volts was passed through the wires. Ignition of the gaseous mixtures was brought about by drawing the two wires apart while the electric current was flowing, thereby producing an electric flash. In all of the experiments the explosion chamber was large enough so that its cold walls exerted no appreciable effect on the results. In spite of the slightly different results one can obtain under different conditions of experimenting, it is believed that the values for explosive limits given herein are close enough to be of decided commercial importance. The results were obtained with gas mixtures kept at atmospheric pressure. The author found that with mixtures of methane and air and of gasoline vapor and air, raising the initial pressure to 6 atmospheres had no appreciable effect in changing the limits of complete inflammation, although the explosion, when it came, was of greater violence. As regards the effect of temperatures, raising the initial temperature from ordinary room temperature to as high as 200 degrees C. only shifts the low limit for methane from 5.5 to about 5.05 per cent. Presumably increases of temperature and pressure affect to about the same degree the other gases mentioned in this report.

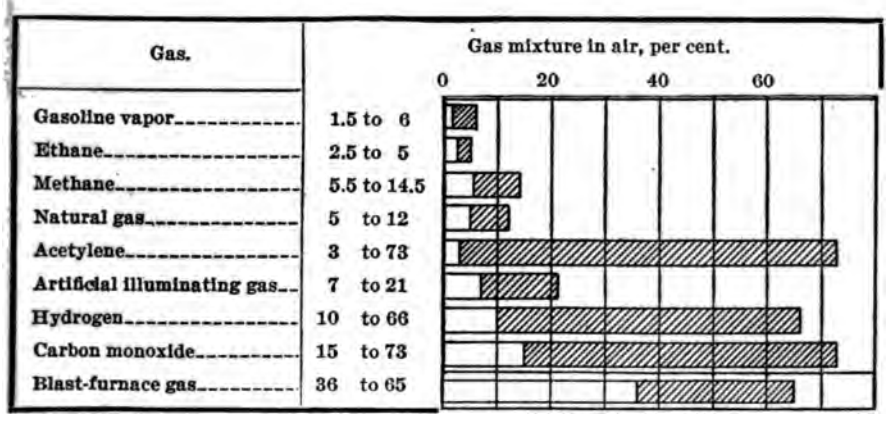


Fig. 1—Limits of Complete Inflammability of Mixtures of Combustible Gases and Air.

Tests Made with Various Mixtures.

With a mixture of air and acetylene containing 2.81 per cent. of acetylene, inflammation did not spread completely through the mixture. The flame traveled for 1 or 2 inches above the terminals but did not spread throughout the mixture. With 3.07 per cent. of acetylene the flame spread entirely through the mixture.

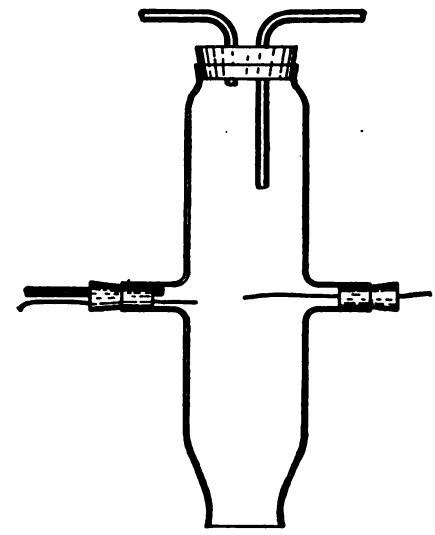


Fig. 2—Apparatus for Determining Air and Gas Mixtures.

With mixtures of hydrogen and air no propagation of flame could be noticed by the eye in mixtures containing 7 per cent. of hydrogen when ignition was brought about by means of an electric spark from an induction coil driven by four small dry cells. But when the mixture was analyzed after sparking it was found that there had been a slight burning, undoubtedly

only in the immediate neighborhood of the spark. As further experiments were tried with increasing percentages of hydrogen the amount of hydrogen that burned increased until, with 10 per cent. hydrogen, it was completely burned.

With mixtures of methane and air, the limits for complete propagation of flame were found to be between 5.5 and 14.5 per cent. With 5.5 per cent. of methane the explosion was not violent. The flame could easily be followed by the eye. With larger percentages of methane—or any other inflammable gas—the explosions became more violent. At the lower limit the flame travels very slowly compared with its speed in richer mixtures.

The incomplete burning of mixtures of air and of combustible gases in proportions below the low limit is well shown by the miner's safety lamp as used in testing for methane in mine air. When a safety lamp is placed in air containing about 1.5 or 2 per cent. of methane, a small cap is usually seen on the flame when the latter is turned low. Careful and experienced men may detect as little as 1 per cent. of methane with a modern safety lamp. As the percentage of methane increases, the cap grows higher.

Incomplete burning also takes place in mixtures of air and of combustible gases in proportions above the upper limit. The upper limit for complete propagation of flame in mixtures of methane and air is 14.5 per cent. But even with a proportion of methane as high as 20 per cent., an electric flash about one-half inch long caused a slight burning, the flame extending about 3 inches above the electric flash. The explosion chamber used was 6 inches wide and 12 inches high. The igniter was placed in the center.

Importance of Oxygen in Mixtures.

At present oxygen is used in increasing quantities for industrial purposes, hence the limits of inflammability of mixtures of combustible gases with oxygen are of immediate interest. As regards methane-oxygen mixtures it was found that the low limit was raised about 0.25 per cent. when pure oxygen was used instead of air. The high limit was, however, extended from 14.5 to 45 per cent. methane, the explanation being as follows: In a methane-air mixture containing 9.47 per cent. of methane and 90.53 per cent. of air there is enough oxygen for complete combustion of the methane to carbon dioxide and water vapor. But if more methane is present, carbon monoxide and hydrogen, products of incomplete combustion, result. This reaction takes oxygen that would otherwise form carbon dioxide and water vapor. Some heat is produced, but much more heat is produced in the formation of carbon dioxide and water. As the percentage of methane is increased above 9.47 per cent. more and more carbon monoxide and hydrogen are formed from combustion until so much is formed that not enough heat is produced by ignition of the gas molecules adjacent to the igniter to cause the mixture to propagate flame. As air is only about one-fifth oxygen, substituting oxygen for an equal volume of air greatly increases the proportion of oxygen available for burning the combustible gas, the gas burns to water vapor and carbon dioxide, the heat of combustion is greater, and the upper limit of propagation becomes higher. Presumably the upper limits for other gases would also be extended if oxygen were used instead of air. However, the low limits are the important ones as regards danger of accidental explosions, and these are seemingly not much affected.

The values for explosive limits given in this report refer to mixtures of the combustible gases with nearly pure air having a normal oxygen content. However, the oxygen content has to fall considerably before the limits of complete inflammability are appreciably changed. For instance, for mixtures of methane and air the low limit is given as 5.5 per cent. of methane, which is the limit when the oxygen content varies between 17 and 21 per cent. With 17 per cent of oxygen in the mixture, the limit is raised to 5.7 per cent. of methane. The oxygen content has to fall below 14 per cent. to prevent all explosions in mixtures of methane and air. Replacing the nitrogen of the air with 20 per cent. carbon dioxide raises the limit to 6.4 per cent. methane. Raising the pressure of a gas mixture above atmospheric has no appreciable effect in changing the explosive range.

The authors compressed mixtures of hydrogen and oxygen in a steel bomb to 100 atmospheres before ignition and found that the explosive range was only a trifle different than the range at atmospheric pressure. The low limit was raised about 1 per cent.

Mixtures of Blast-Furnace Gas and Air.

Explosions have occurred at blast furnaces owing to the leakage of air into gas conduits and the subsequent ignition of the resulting mixture. The results of experiments to determine the explosive limits of mixtures of blast-furnace gas and air are presented herewith. In the experiments a glass vessel of the shape shown in Fig. 2 was used. It was 8½ inches long and had a capacity of 900 c.c. A little above the center two copper electrodes were so arranged that they could be separated by the operator to produce an arc. The top was capped with heavy waxed paper. All experiments were made with the mixtures saturated with water vapor at room temperature and atmospheric pressure. The blast-furnace gas used had the following composition:

Constituent.	Per cent.
Carbon dioxide	10.0
Oxygen	0.5
Hydrogen	2.7
Carbon monoxide	27.5
Methane	0.3
Nitrogen	59.0
	100.0

Following are results of experiments to determine explosive limits of mixtures of blast-furnace gas and air (Fig. 3):

The proportions of blast-furnace gas that mark the limits of inflammability of mixtures of air and blast-furnace gas of the composition given are 44.9 to 45.7 per cent. for the low limit gas and 64.5 to 65 per cent. for the high limit. Thus, in order to have an explosion of blast-furnace gas, not less than 35 cubic feet nor more than 55 cubic feet of air

Test No.	Percentage of blast-furnace gas in gas-air mixtures.	Remarks.
1	20.0	No ignition.
2	30.0	Do.
3	39.2	Do.
4	44.8	Do.
5	50.0	Ignited at once. Blue flame traveled upward and downward.
6	46.5	Ignited at once and blew cap off.
7	45.7	Do.
8	44.9	Small tongue of flame started at arc and rolled to top. No complete inflammation.
9	56.1	Ignited at once and blew off cap.
10	57.0	Cap blown off.
11	61.0	Do.
12	62.0	Do.
13	72.0	No ignition.
14	67.9	Do.
15	65.0	Slight snapping ignition around arc. No complete inflammation.
16	64.5	Ignited at once and flame filled bottle.
17	66.0	No ignition.

Fig. 3—Explosive Limits of Mixtures of Blast-Furnace Gases and Air.

must be present in 100 cubic feet of a mixture of such gas with air. The composition of iron blast-furnace gas varies considerably in practice. Following is a table (Fig. 4) taken from Metallurgical and Chemical Engineering, volume 10, 1912, page 713, which was compiled from 860 different tests, covering a range of more than 20 furnace linings.

Stoughton gives the average composition of blast-furnace gas as about 61 per cent. nitrogen, 10 to 17 per cent. carbon dioxide, and 22 to 27 per cent. carbon monoxide. The maximum variations in the composition of blast-furnace gas are apparently in the percentages of carbon dioxide and carbon monoxide. If 45.5 per cent. of gas be taken as the lower limit of the gas, then the limit mixture contained 12.5 per cent. carbon monoxide, 1.2 per cent. hydrogen and 11.6 per cent. oxygen. Should the carbon monoxide content drop to 22 per cent. and the carbon dioxide content increase to 17 per cent. the hydrogen and nitrogen contents remaining approximately the same as before, then 56.8 per cent. gas will be required before 12.5 per cent. carbon monoxide will be present. If the percentage of carbon monoxide should increase, then the lower limit of such a gas would be lower than 45.5 per cent. The maximum per cent. of carbon monoxide in the table is 34.4 per cent. Of this gas 36.3 per cent. would furnish 12.5 per cent. carbon monoxide. The upper limit, however, would not be changed appreciably, as it depends on the percentage of oxygen present which in turn depends on the percentage of air. For pure carbon monoxide the high limit is only 73 per cent., for pure hydrogen 66 per cent. The lower limit for blast-furnace gas in general, therefore, varies with the amount of combustion present in the gas from 36 to 57 per cent. gas. The upper limit will, however, be approximately 65 per cent. gas for all gases.

Coke used per ton of metal.	Product.	CO_2.	CO.	H_2.	N_2.
Pounds.		*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
3,200-3,400	Spiegel	6.2	30.9	2.3	60.6
3,400-3,500	.....do	7.0	30.0	3.5	59.5
4,800	Ferrosilicon	3.5	32.5	2.0	62.0
5,300-5,400	Ferromanganese	4.6	32.6	1.2	61.6
5,400-5,500	.....do	3.6	32.2	2.2	62.0
5,500-5,600	.....do	5.0	28.0	2.6	64.4
5,700	.....do	3.4	33.8	2.4	60.4
5,800	.....do	4.3	33.1	1.7	60.7
5,900	.....do	3.8	32.9	2.4	60.7
6,000	.....do	5.0	34.4	2.7	57.9
6,100	.....do	3.0	31.2	2.0	61.8
6,500	.....do	4.4	30.8	2.2	62.6
7,503	.....do	3.6	32.4	2.4	61.6
2,100-2,200	Bessemer iron	13.1	24.1	1.7	61.1
2,200-2,300	.....do	12.1	23.9	2.0	61.9
2,300-2,350	.....do	11.8	25.6	2.1	60.5
2,350-2,400	.....do	11.8	24.8	1.9	61.4
2,400-2,450	.....do	11.7	25.4	1.4	61.5

Fig. 4—Character of Gases Produced in Blast Furnaces Using Natural Air With Corresponding Coke Consumptions.

Friction Losses

How Money Can Be Saved in the Gas Plant by Proper Precautions

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If unnecessary friction costs a gas plant owner $5 per day, and if that friction could be eliminated by an expenditure of $4 per day, it should be considered good business to spend $4 to make $5, and thereby save $300 per year, if there are 300 working days per year. Yet superintendents and managers are daily overlooking the savings possible in the direction of reducing friction. Poor bearing design and improper care of bearings are largely responsible for much of the wasted money. Windage is another thing that might well be considered. Poor oil, insufficient oil, unnecessarily heavy pulleys and shafting, unnecessarily tight belts and misalignment of shafting are all factors that eat up money in the form of friction.

There is no mathematical formula in existence that can be applied to any friction problem. Every problem is different, and the foreman or superintendent must exercise good judgment, principally. Take the case of "too large shafting." Ever hear of such a thing before? In the old days they used to say "the bigger the better," but not so today. Even the shafting must be "just right"—not too large and not too small. It would be nice, of course, if we could use shafting that didn't weigh any more than cork, for instance, but there's no such shafting. So, in order to minimize the friction loss in the gas plant, the more up-to-date ones are being cautious about the size of the shafting. It is well to reduce the weight of all moving and rotating parts to the smallest amount practical. Wood pulleys and steel pulleys are therefore frequently resorted to. And where a drive can be simplified by eliminating a jack shaft or countershaft, such practice is also commendable. Where power is distributed by shafting and belting, it is also good practice to place the driving engine or motor at the center of the main shaft, if possible.

For example, take a 100-horse power engine. Put it at the "end" of the main line shaft, and the shaft must be designed in accordance with the formula

$$H.P. = \frac{d^3N}{c} \text{ where}$$

d = diameter of shaft in inches.

N = revolutions per minute of the shaft.

c = a constant depending on the kind of material used in the shafting, and on the spacing of the bearings.

If, in this case, H.P. equals 100, it is plain that the shaft diameter would have to be considerably larger than where the engine is placed at the middle of the shafting in such a way that 50 horse power could be transmitted in each direction. The diameter of the shaft, then, would have to be only

$$\sqrt[3]{\frac{50 \times c}{N}}$$

whereas with the engine placed at one end of the shafting the diameter would have to be

$$\sqrt[3]{\frac{100 \times c}{N}}$$

Now, if we choose a value of 60 for c and have the main shaft run 100 r. p. m., you can easily figure for yourself, by using the above formulas, that with the engine placed at an end position, the shafting would have to be about four inches in diameter. At a central position the diameter would have to be only three inches. And since 4-in. shafting weighs and costs nearly twice as much as 3-in. shafting, it is plain that this phase must be considered in the gas plant layouts.

Speed, also, is important. Higher speeds are being favored more and more. This is largely due to the successful use of ball bearings. High speed doesn't mean high friction where designing is properly done, even with plain bearings. It isn't enough to hire

a man to keep constantly oiling bearings, or turning grease cups up tighter. These designing and arrangement problems must always be considered from the initial conception and upward. Every point is of value, and where the gas plant is already in active operation, where it wouldn't pay to change pulleys and shafting except under very unusual conditions, the superintendent must again exercise his best judgment in reducing friction.

Very often instances have been called to my attention where investment in very small things has saved much money. The ratio is much greater than $4 to $5, as initially stated in this discussion. The ratio is sometimes as great as 29 cents to $80, or even greater.

To drive the meaning of the statements home more strongly, you have doubtless seen locomotives endeavoring to pull heavy loads without moving an inch. The drive wheels go around all right and the engine makes much noise. Just as much coal and steam are consumed as where the engine is actually pulling a heavy load. The tire and rail are being badly worn. Money is being wasted. Should the locomotive stay there all day, and continue to slip all day, the money loss might amount to $100. But, by investing in a few cents' worth of sand, which prevents such slip, the $100 per day is saved. Thus the ratio might be 10 cents to $100.

Similarly in the gas plant. Investment in the little things to stop friction losses usually proves to be sound and worth while. Maybe your bearings are improperly cared for. Maybe your windage losses can be materially reduced. Maybe your oil isn't performing as it should and you should use a different grade. Maybe you aren't using enough oil. Your pulleys and shafting may be so heavy that it would pay you to sell your present heavy stock and install something lighter and besides "clean up money" on the change. Your belts may be too tight. It is possible, you know, to run most belts nice and slack under proper treatment. Maybe your shafting needs aligning. Have you looked into these various little things? They are small, yes, but important.

Concrete Chimney

Construction of Modern Stack Recently Completed at Shreveport

The Southwestern Gas & Electric Co., Shreveport, Louisiana, recently completed a chimney of the type known as the Weber coniform reinforced concrete, having a total height from the foundation base of 207 ft. 6 in., with an inside diameter at top of 12 ft. The purpose of this chimney is to serve a boiler installation of approximately 5,000 horsepower, replacing three steel stacks formerly used at the gas and electric light plant, and taking care of additional boilers now being installed.

The diameter and wall thickness have a uniform taper from 17 ft. 5/8 in. outside diameter at the base of shaft gradually decreasing to 12 ft. 10 in. outside diameter at the top. The wall thickness of 15 in. at the base of shaft tapers to 5 in. at the top. The materials in the shaft consisted of a wet mixture of one part Portland cement, 2½ parts sand and four parts crushed stone, 1 in. in size, thoroughly mixed at the base of chimney, so as to permit any inspection that might be desired. The steel reinforcement consisted of a sufficient number of vertical bars and horizontal rings to take care of any stresses caused by temperatures and wind pressure. The foundation is 27 ft. square, 5 ft. thick, and consisted of a wet mixture of one part Portland cement, three parts sand and five parts crushed stone, 2 in. in size. Requisite amount of steel reinforcement was placed diagonal and parallel to the sides so as to form a perfect network, underneath which the vertical bars, extending from the shaft of the chimney, were hooked to secure proper anchorage for the chimney.

Concrete Chimney at Shreveport, La.

During the time the outer wall of the shaft was being constructed, a reinforced concrete lining, four in. thick and reinforced both vertically and horizontally with steel bars, extending to a height of 58 ft. 6 in., starting from a point 27 ft. above the top of foundation, was built. There is a 4 in. airspace between this lining and outer wall to permit freedom of expansion and contraction. The chimney is equipped with a cleanout door 18 in. by 30 in. bronze roll and cable and a two-run four-point lightning conductor.

The contractors who specialize in the construction of reinforced concrete chimneys, recently completed what is said to be the highest chimney in the world for a copper smelter in Japan, 570 ft. high, 26 ft. 3 in. inside diameter at the top, being 60 ft. higher than any chimney ever built.

NOT A CUSTOMER.

Has Been Lost To Electric Competition by This Utah Gas Company.

Of the various gas companies in which P. W. Brooks & Co., of New York, are interested, they are now devoting particular attention to the Port Arthur (Texas) Gas & Power Co., where they are installing a new holder to meet the demands of the unprecedented growth of the city. According to census figures, Port Arthur is now the fastest growing city in the United States. Brooks & Co. also are extending the plant of the Utah Valley Gas & Coke Co., at Provo, Utah. The mains have been extended to the towns of Springfield and Spanish Fork, a distance of several miles from Provo, and several hundred customers already have been connected in both communities. It is interesting to note that not a single gas customer supplied by this company has been persuaded to replace his equipment with electric fixtures during the entire year of 1917. On the other hand, the gas company has secured many new customers who formerly were supplied by the electric company.

E. E. Price now is new-business manager of the Gary (Ind.) Heat, Light & Water Co., succeeding L. B. Snowden, who resigned to open an electrical supply store there.

R. P. McConnell, formerly manager of the St. Clair County Gas & Electric Co., at Belleville, Ill., now is with the Waukesha (Wis.) Gas & Electric Co.

GAS LITERATURE AT A GLANCE

Conducted by R. S. McBride and C. E. Reinicker, Bureau of Standards, Washington, D. C.

Steel Tubes in the War Area.

From Canadian Briefs, "Inter-colonial Gas Journal of Canada," 10, 329, Sept. 1. —On the eastern margin of the Vosges mountains in Alsace a number of small places are supplied with gas through a 4-in. main nearly fourteen miles long. The gas is supplied to the main at a pressure of 30 to 45 pounds per square inch and is reduced to ordinary pressure before distribution to customers. At Mutzig the road in which the main is laid passes over a stone bridge. The bridge was mined at the beginning of the war, ready to be blown up at a moment's notice. Subsequently the charge was exploded by lightning. The arch was destroyed, a gap 11 to 12 feet long being made in the stone work. The high pressure main as well as a low pressure main line alongside remained intact. Both mains were 4-in. Mannesmann steel tubes. They were distorted out of the straight line for a considerable distance and for a length of twenty inches they were flattened into an oval section. The high pressure main remained absolutely gas tight but the low pressure main leaked slightly at the nearest coupling.—D.

Paper Gas Pipes.

By M. Rudeloff, "Journal of the Society of Chemical Industry," via "Gas Journal," 139, 23 (July 3).—The tubes are made by rolling paper to the desired diameter and thickness of wall, fastening with a suitable adhesive and applying a protective coating. They are intended to serve as pipes for gas and water. According to calculation, the specific resistance to direct hydraulic bursting pressure is 5,120 lbs. per sq. in. It is stated that the tubes are not affected by prolonged exposure to the action of coal gas. Some which stood full of water for several weeks showed no signs of swelling or loss of resistance. The pipes are only one-sixth to one-tenth the weight of lead pipes and resistance three times the pressure for equal diameters.—D.

Creosote Restrictions (British).

By the Minister of Munitions, "Gas Journal," 139, 117 (July 17).—The order has been promulgated that all users of creosote oil, green oil, sharp oil, anthracene oil, or other oils, with a specific gravity of 1.000 or more, distilled from coal tar, and all oils with a specific gravity of 0.950 or more distilled from other tars, shall within two weeks file with the controller of mineral oil production, particulars as to source of supply, quantity used during the first half of 1917, estimated requirements for second half of 1917, and use to which it is put. No person shall henceforth, except under license from the minister of munitions, use any creosote for water proofing, preservation of timber, or for road work, nor shall any person, except under license, sell or offer for sale creosote.—D.

The Complete Gasification of Coal

By Dr. Alex. Noumann. "Chemiker-Zeitung" (Jan. 3), via "Gas Journal," 139, 67-8, (July 10).—The producer or carbonizer consists of a tall vertical retort heated internally by gas. The coal passes downward through this producer while the heating gases pass upward; the temperature gradually increasing from top to bottom. Water, ammonia, readily volatile oils, and high grade gas are given up by the coal, which later yields viscous tar, hydrocarbons of the methane series, hydrogen, and carbon monoxide. The completely carbonized coal passes on as coke to the generator which is directly under the retort with no dividing wall or partition. In the lower part of the plant the coke reacts with steam to produce water gas. The supply of heat needed for generation and carbonization is provided by periodical blows of the coke, the products resulting being discharged into the outer air. The air blast enters at the zone between the two parts of the plant and travels downward through the coke. Simultaneously a hot blast is maintained over the lower part of the retort, by a reversible air blast passing over a fire bridge. The blast is from one to three minutes, followed by five to ten minutes steaming during which the water gas passes up through the coal gas retort. It is claimed that the process will handle any kind of coal giving complete conversion into 260 to 370 B.t.u. gas, tar, and ammonia, leaving only clinker or ash as a residue.—D.

Estimation of Benzene and Toluene in Coal Tar Oils.

By G. Harker, "Journal Royal Society of South Wales," via "Gas Journal," 139, 22 (July 3).—It is pointed out that in the estimation of toluene and benzene in coal tar oil it is usual to subject the oil to a preliminary distillation to 150° C. or 170° C., followed by a washing of the distillate with sulphuric acid and caustic soda. The washed product then is distilled under conditions varying considerably. From the volume of the fraction collected between certain temperatures and by references to tables the composition may be deduced. The range of such tables is limited, and occasionally pure benzene, toluene, or xylene must be added before distillation. The writer carried out a series of experiments with pure materials and found that when mixtures of benzene and toluene in the proportions of 3 to 1 or 4 to 1 were distilled, the volume distilling up to 90° C. represented the volume of benzene. With a fifty-fifty mixture, the first half came over up to 95° C. Additions of pure xylene necessitated still higher temperatures. The actual amounts of each constituent in the sample was determined by blank tests. After distillation, the distillates were washed with sulphuric acid and soda. The paraffins present were estimated by sulphonation test, with anhydrous sulphuric acid.—D.

Some Sources of Benzene and Toluene for High Explosives.

By T. F. E. Rhead, "Jour. of Society of Chemical Industry," via "Gas Journal," 139, 148-9 (July 24), "Gas World," 67, 38 (July 21).—The author reviews the present state of knowledge concerning the production of benzene and toluene, observing, however, that much valuable work is being kept secret for national reasons. The value of these hydrocarbons for subsequent nitration depends upon their case of purification. Paraffins in toluene are objectionable. The various sources are classed under four heads: (1) Synthetic, catalytic and electrical; (2) certain crude petroleums contain these hydrocarbons in uncombined state; (3) the destructive distillation of coal; (4) the thermal decomposition or "cracking" of petroleum oils. The methods under group (1) are, so far as is known, in the experimental state. Considerable quantities of benzene and toluene are obtainable under group (2) from petroleums of certain districts. Group (3), coal distillation, is by far the most important source of these hydrocarbons. They are formed from the primary thermal decomposition products by three main groups of reactions: (1) Condensation of olefines of 700° F. upwards; (2) dehydrogenation of certain naphthenes at 500° C. upwards; (3) polymerization of acetylene at 700° C. upwards. The factors governing carbonization so far as they bear on benzene and toluene production are discussed. The oil cracking process under group (4) is also treated.—D.

Effect of Carbonization Temperature on Physical Properties of Coke.

By M. M. Georges Charpy and Marcel Godchot, French Academy of Sciences, via "Gas Journal," 139, 152 (July 24).—The authors describe some results of a laboratory test worked out to determine on a laboratory scale the temperature best suited to improve the quality of coke from coals which are not in the coking category. As a criterion of the quality the resistance to compression is adopted and is measured by a smaller lever machine. The coal to be tested is powdered and sieved through a 120-mesh sieve. It is then kept several days in an atmosphere saturated with water at 18° to 20° C. It is then packed in a refractory tube and subjected to a pressure of 71 lbs. per square inch. The ends of the tube are then closed by heavy cast iron discs and the whole then heated in an electric furnace of such size that the introduction of the coal does not materially affect its heating power. This method yields small cylinders of coke ½ in. by 25/32 in., of perfectly regular shape, to which the compression test is easily applied. In testing the effect of temperature of carbonization, the charged tube is placed in an electric furnace previously brought to the given temperature and the heat continued for one hour. Results with certain French coals are given in tables. —D.

Observations on Crude Benzol.

By Speilmann and Petrie, "Gas Journal," 139, 69 (July 10); "Gas World," 67, 3 (July 7).—The authors found that if 100 c.c. of crude benzol is distilled from a distilling flask, the amount obtained up to 90° C. can be made proportional to the quantity of benzene present and that from 90° to 120°, proportional to the quantity of toluene in the sample. Another method of examining crude benzols, yielding more accurate results, is to distil at least a liter over a Young 12-pear still head and notice the rise in temperature for every five or ten per cent. When such data are plotted in curves, the horizontal distances below the five per cent. mark and the point where the curve intersects the 92.5° C. line give a close measure of the benzol present. A similar close estimate of the toluene present may also be made. The authors find that if the quantities of benzene, toluene and xylene found in the fraction up to 170° C. be plotted against the loss on acid washing this fraction, the two main constituents are in inverse relation to each other, and if these are added together and combined with the figure for xylene, the total aromatic substances in the fraction show a remarkably close inverse relationship to the loss upon acid washing.—D.

Picric Acid as a Future By-Product of the Coke Oven Industry.

By Thos. B. Smith, "Gas World," 67, 10 (Coking Section) (July 7).—The writer expresses the opinion that as picric acid is entirely obtained from coal tar or benzol, of which coal tar from coke ovens is the most important source, the coke oven manager will shortly count picric acid as one of his finished products. While the details of manufacture of picric acid are secrets with various manufacturing firms, the principle is well known. It is obtained by exhaustive nitration of phenol, generally in the form of pale yellow scales. Fused picric acid, when used for filling shells, is known as "lyddite" or "melinite." When ignited, it burns quietly, but can be exploded by detonators. The methods of manufacture of picric acid from phenol and from benzol are outlined and the preparation of pure alcohol from carbolic oils of tar distillation and from benzol are described, as well as the subsequent nitration to picric acid.—D.

Vertical Retorts as Water Gas Makers.

By Dr. R. Gespirt. "Gas World," 66, 510; (June 23).—The writer recommends the following procedure for making water gas in vertical retorts: A vertical retort capable of handling 1.2 tons of coal in 12 hours is heated up in the usual way and then filled with bumper nut coke. The coke will be glowing in 6 hours. Then steam is admitted through a nozzle 0.14 inch in diameter and under a pressure of 28 pounds for 18 hours. This will represent 539 pounds of steam. The spent coke and ashes are then raked out. The water gas produced is about 17,000 cubic feet. After using a vertical in this way it is next charged with coal so as to fill up with carbon any chinks in the retort. One or two retorts out of a bench or battery may give all the water gas necessary. In making water gas by steaming in the usual way, trouble arises in the final stages because the dense layer of coke becoming covered with a protective layer of ash.—D.

Wood in Gas Making.

By M. H. Laurain, "Technical Society of French Gas Industry" via "Gas World," 67, 61 (July 28).—Some of the gas works of France, situated near wood lands have been experimenting with wood as a source of gas. For two years the works at Romorantin has obtained 9 to 10 per cent. of its total output from wood. The charges are two cwt. for pine and 2.4 cwt. for oak; care is taken not to keep any given retort at work distilling wood more than twenty-four hours; else ascension pipes become blocked. Per ton of pine the yield is 8.800 cubic feet of gas and three cwt. of charcoal, per ton of oak the gas is the same and the charcoal 3.6 cwt. At the Bone works, they distill white eucalyptus in blocks not exceeding six in. each way. The ordinary 10-ft. retort can take charge from 2.6 to three cwt. The best temperature of distillation is that which would enable coal to be worked in five charges per day, but the actual period of distillation is from 3¾ to four hours. The yield of gas is 10,600 to 10,950 cubic feet per ton with a heating value of from 404 to 427 B.t.u. This gas if sent out alone would require readjustment of burners, but if the proportion does not exceed 25 per cent. in coal gas it seems to make no difference with the burners. At Benfort, pine is used and yields 8,800 cubic feet per ton of 14½ candlepower gas when mixed with coal in the proportions of one part wood gas and three parts coal gas. At Angers, pine dried six weeks behind the benches is used. The yield of 16 c. p. gas is about the same as with coal. The yield of charcoal is about 18.6 per cent. by weight. The greater the amount of resin in the material, the larger the yield and the richer is the gas, but the less is the percentage of charcoal obtained. Wood gas contains acid products; but little sulphur. Enough coal must be distilled with it so that the ammonia produced will neutralize the acid. —D.

Operating Carburetted Water Gas Plants for the Production of Blue Water Gas.

By Council of the Institution of Gas Engineers, "Gas Journal," 139, 61 (July 10). "Gas World," 67, 23 (July 14).—Carburetted water gas can be operated for the production of blue water gas without structural changes by a readjustment of the generating conditions, i. e., principally in the rate and period of blasting and steaming and the height and character of the fuel bed. The object to aim at for commercial working is to minimize waste of heat due to the volume of CO, and the quantity of sensible heat in the blast products. This requires in practice slow steaming and quick blowing, which is effectively accomplished by altering the timing of the cycle. In beginning the change the adoption of a somewhat shorter cycle with the fuel depth unaltered is the best step to take. If the customary operating cycle is three minutes blowing and five minutes steaming, a trial with two-minute blows and five-minute runs is advisable, keeping the CO_2 content in the finished gas below six per cent. The CO_2, if too high, may be reduced by cutting down the steam or the length of the steaming period or by longer or stronger blast. —D.

Nitric Acid from Coal Gas.

By Prof. Hausser, "Times Engineering Supplement," via "Gas Journal," 139, 21 (July 3).—A trial plant for manufacturing nitric acid from coal gas or similar gases was known to be in operation on a fairly large scale at the Nuremberg, Germany, gas works, before the war. The plant is said to consist of a battery of chambers or bombs in which mixtures of gas and air are exploded by high tension electric sparks. To obtain the high temperature essential to the process the air, after compression, is passed through a preheater operated by gas and a small proportion of pure oxygen is regularly mixed with the air. The explosion chambers are surrounded by a water jacket. The nitrogen in the gas and air are oxidized to nitric acid and then to nitric peroxide, which, combining with water, forms nitrous and nitric acids. The nitrous acid is oxidized further to nitric acid. The acid obtained varies in strength from 30 to 50 per cent. The waste gases are treated in washing towers and from two to three per cent. of the nitric oxide gas is lost. When using coke oven gas 6¼ lbs. of acid per 1.000 cu. ft. of gas is a maximum yield.—D.

Elimination of Tar Fog.

The Fisher-Fiddes Patent Extractor, "Gas World," 139, 20 (July 3).—This apparatus was originally designed in a different form for the removal of dust from the producer gas required for heating the vertical retorts at Tottenham, but with slight modification was found very effective in removing the tar fog from coal and carburetted water gas. The idea is to pass the main stream of gas through a rapidly moving jet or film of clean gas or through more than one set of jets or films if necessary, whereby, in the case of tar, the particles are made to impinge at a suitable angle against a plate from which it collects in a tar receiving chamber. The gas used for the clearing passes with the particles of fog into the chamber and returns to the main stream through relief ports, which may be fitted with valves. For a separator with 20-inch connections, capable of handling two million cubic feet per day, a three-inch pressure pipe is sufficient. The gas pressure in the pressure chamber of the separator is about 12 inches.—D.

A Boiling Ring with Automatic Gas Tap.

By M. Benik, "Gas Jounal," 139, 21 (July 3).—The gas ring has two independent burners, one large and one small. The smaller burner acts as a pilot. The larger burner is connected by a system of levers to a rod of an alloy of high expansive capacity. The cover of the kettle has a hole through which a jet of steam issues when the water in the kettle boils. The jet of steam impinges against the expansive rod, causing it to expand and shut off the gas supply to the main burner. Upon cooling, the burner cock is opened by a spring and the gas ignites from the pilot. In this manner the water in the kettle is kept at the boiling point with a minimum gas consumption.—D.

NEW PRODUCTS

A Thorium Giant

Lindsay Light Co. of Chicago, Has Developed International Industry

A big new thorium enterprise, under an old established firm name, has arisen in the west since the world war began and today when measured by the breadth and scope of its far reaching business it must be reckoned among the giant enterprises of the gas industry. It is the Lindsay Light Company, of Chicago. When it is stated that this well known house manufactures and supplies to mantle factories over half of the thorium used in gas lighting equipment in the United States and of Great Britain, the significance of its business achievement and its influence on the general industry can be realized. Its total thorium output for the year produces over 127 million mantles per annum, the largest output of any refinery of its kind in the world.

The Lindsay Light Company has been a prominent factor in the gas lighting field for many years, its principal industry before the war being the manufacture and distribution of mantles. The house proceeded about its business without any great amount of flourish and built up a wide and profitable trade in the new equipment that has brought gas lighting to the front as the best and most economical illuminant for urban population. It traveled a score or more of men and established a name for itself synonymous with good workmanship and square dealing. It has long been known throughout the country as one of the leading mantle manufacturers.

In its activities prior to the outbreak of the war the company's thorium production was limited.

When the conditions of the British blockade cut off the German thorium refineries from their supply of Travancore sand, from India, it was the Lindsay Light Company that first observed and took advantage of the opportunity to acquire this great supply of rare and highly advantageous sand. It is only in one or two far-off countries that monazite sand is found, and the Travancore deposits are the largest and richest of all these It was through this supply from India that the German producers took the lead in manufacturing thorium, and it is readily understood that with this great source available for its exclusive use, the Lindsay Light Company began immediately to figure prominently in the world's thorium trade.

The limited mantle factory and refining capacity of the company in Chicago were rapidly enlarged to meet the changed conditions. The company continued and still is engaged in manufacturing mantles to supply its big list of customers, but its thorium refinery naturally has jumped far ahead of this department in extent and importance in the organization and in the international gas industry. In building up the thorium industry to its present enormous capacity, the company utilized strictly its own resources.

Several buildings in the vicinity of the company's general offices were secured as temporary houses for the thorium refinery. Of course there will soon be a modern plant started, for already the business has far outgrown the temporary housing. The buildings were reconstructed and fitted with proper machinery by Lindsay men only, and serves their purpose well at the present juncture. Over four score men and twelve great cooking vats are working twenty-four hours per day and six days in the week to turn out enormous quantities of precious lighting fluid demanded by the mantle factories of this country and England. Two and a half tons of monazite sand are consumed in the vats each day.

The Lindsay product is standard in quality and measures up to every requirement of high grade mantle making, according to American and British manufacturers. There is a strict compliance with standard specifications on the part of every Lindsay employe, and this fact no doubt accounts for the wide popularity of the Lindsay thorium in the markets of this country and the world. The London representative of the company directs the sales for all of Europe and readily places every pound of the product the company allows him for his big territory. In this connection it is interesting to know that only two shipments of this costly material has been hit by the German U-boats, and not a single ship load of monazite sand has been sunk at sea on its way from far-off India.

From these interesting facts and figures it can be logically reasoned that the Lindsay Light Company will enjoy constantly increasing popularity and influence in the gas lighting industry of America and its Allies.

Asbestos Protected Metal Co. Opens Cincinnati Office.

The Asbestos Protected Metal Co., of Pittsburgh, announces the opening of a sales office in the Union Central Building, Cincinnati, under the direction of J. C. Lathrop.

Laboratory and Workshop Gas Appliances.

An unusually complete line of industrial gas appliances for colleges, schools, chemists, assayers, manufacturing jewelers, experimental laboratories, work shops and tool rooms are illustrated and fully described in catalog B 1917 issued by the Buffalo Dental Manufacturing Co., Kehr and Urban Streets, Buffalo, N. Y. A copy of this publication will be mailed to gas companies on request to the manufacturer.

Link-Belt Silent Chain Advances in Price.

The heavy increase in the price of steel has necessitated issuing a temporary price list on Link-Belt silent chain to supersede all previous lists. The new list prices may be obtained on request to the Link-Belt Co., Chicago.

Venturi Meter Featured in New Bulletin.

Valuable information regarding the construction and material used in the Venturi meter has been issued in bulletin 143. This publication is well worth adding to gas company files as it may prove of convenience when selecting such equipment in the future. A copy may be obtained from the Builders Iron Foundry, Providence, R. I.

Oxweld Acetylene Co. Adding to Its Newark Plant.

The Oxweld Acetylene Co. has started work on a $11,000, one-story, 42 by 60-foot addition to its welding shop at Newark, N. J.

DUAL FUEL FURNACE.

Manufacturer of This Appliance Claims It Cuts Down Fuel Cost.

Complaints of high gas bills and criticism of inadequate supply and interruption of gas service can be almost eliminated with the use of the new patented high efficiency "Dual Fuel" gas-coal furnace, according to its manufacturers.

"Do not confuse it with other so-called 'combination' furnaces, suitable for coal, but wasteful and extravagant with gas as fuel," says the Gas Appliance Co., of Cleveland in its circulars. "Observe the short fire travel for coal and long separate travel for gas; two furnaces in one casing. Gas or coal may be used separately or together without

Dual Gas Furnace.

change of any kind. Due to long, safe, upward fire travel gas can be economically burned. You will do your patrons a kindness and benefit yourselves by selling or recommending this new furnace.

"If you do not sell furnaces, show the circular to a responsible dealer, then drop us a line and give us his name and address, or have him write us. Prices and further particulars gladly furnished on request to you or dealer."

Beaver Products Selling in Car Lots Now.

The Borden Co., maker of "Beaver" die stocks and pipe cutters, is mighty proud of the carload of its product which was recently shipped to the Oil Well Supply Co., of Tulsa, Okla. This is said to be the first carload of this kind of goods ever shipped and is equal in value to 120 carloads of iron ore, according to the statement of W. A. Phillis, of the Borden Co.

METER CONNECTIONS.

Latimer-Stevens Co. Products Have Won Wide Popularity on Merits.

The Latimer-Stevens Co., of Columbus, O., is now in the tenth year of its growing activities and popularity. It is this company whose meter seals and connections, together with its standard shelf, have won the approval of the gas industry's best authorities, including the experts on the committee of the American Gas Institute, as shown in the committee reports. The company has issued a fine catalogue handsomely illustrated with cuts of its products and details of their construction, with prices, etc. The foreword in this booklet may be cited as the company's message to the industry in regard to these products:

"During the past ten years the subject of better meter installations has held the attention of all gas men. We have now a standard connection with hanger and shelf which has passed every inspection of the best gas engineers in the country. Our connection is readily adjusted to any variation in the width of meter or in the alignment if meter tubes. Engineers have found that the best practice is to use a shelf under the meter. We have offered the gas companies a standard shelf that will support the meter at all times, and give them a uniform setting. We attribute our success in a large measure to our shelf attachment. It has proven beyond doubt that it will prevent leaks from washer shrinkage. Our shelf holds the meter firm and rigid preventing any strain from falling on the meter tube. We are ready and willing to send a sample of our connection free of charge at any time and would appreciate your writing for them."

Rack for Advertising Literature on Gas Appliance Sales Floor.

Hugo Gives Ad Rack for Showrooms.

The Hugo Manufacturing Co., maker of the Hawks ventilating gas radiators has a good idea for its customers. It is a metal wall rack for Hawks advertising literature and is intended to be hung beside the Hawks appliance displayed on the gas company floor. These racks encourage the distribution of gas heating literature to the right parties and prevent waste. The racks illustrated may be had upon request from the Hugo Manufacturing Co., West Duluth, Minn.

"Pittsburgh" Heater in New Southern Home.

The Southern sales office and distributing depot of the Pittsburg Water Heater Co. is now located at 922 Common street, New Orleans. In the new location they have fitted up a handsome display of the various types of gas water heaters, and J. L. Walker, southern district sales manager, reports that they will be able to display and demonstrate the "Pittsburgh" heaters to any of the customers of the New Orleans plumbers to better advantage. The accompanying photograph shows the two attractive display windows which Mr. Walker takes pride in having trimmed out of the ordinary. The new location is in the center of the shopping district of New Orleans. One may be sure that the local plumbers will be glad to take advantage of the opportunity now afforded them in directing their clients to call and have an actual demonstration of the various size "Pittsburgh" heaters, so that they can determine the proper size heater they should have in their home.

Carload of Beaver Die Stocks and Cutters.

New Home of Pittsburg Water Heater Co. at New Orleans.

Welsbach Co. Has Still Another New One.

The fixture illustrated here is taken from the gas company supplement recently issued by the Welsbach Co. The fixture is known as No. 1646, of Sheraton design and equipped with No. 1512 bowl, crystal, roughed outside. Any bowl not less than 7½ inches in depth with 14 or 16-inch flange neck may be used. About October 1 the bowl shown in the illustration will be offered with colored decorations. Both bowl and fixture are correct in design, neat in appearance and should be the

The Welsbach No. 1646.

means of increasing gas lighting in residences. One gas company has already ordered one thousand of these fixtures for use on a special residence campaign this fall.

BALANCED COVER.

Novel Manhole Device for Gas Companies Developed by St. Louis Company.

A balanced cast iron manhole cover and frame has been developed for gas main vaults which is meeting with unusual success as evidenced by the many large companies adopting this equipment for such work. When closed the cover is locked by a gravity catch. It is opened with a key, which forming a handle, permits one man to readily raise the cover. A counterweight, adjusted by means of a shaft and lever arms, holds the cover in a vertical position. The accompanying illustration shows a longitudinal and cross section through a gas main pit with the manhole cover, frame, counterweight, etc., installed. The dotted lines show the position of the cover when open. The device is made in two sizes. All dimensions are standard except the length of the shaft which is made to conform to the width of the pit. Further information may be obtained from the Banner Iron Works, 4560 Shaw Avenue, St. Louis.

Sarco Temperature Regulators Favored by U. S.

The Sarco Co., New York, N. Y., has received orders for temperature regulators for each of the sixteen United States cantonment camps; also for the Selfridge aviation field near Mt. Clemens, Mich., and for the League Island navy yard, Philadelphia.

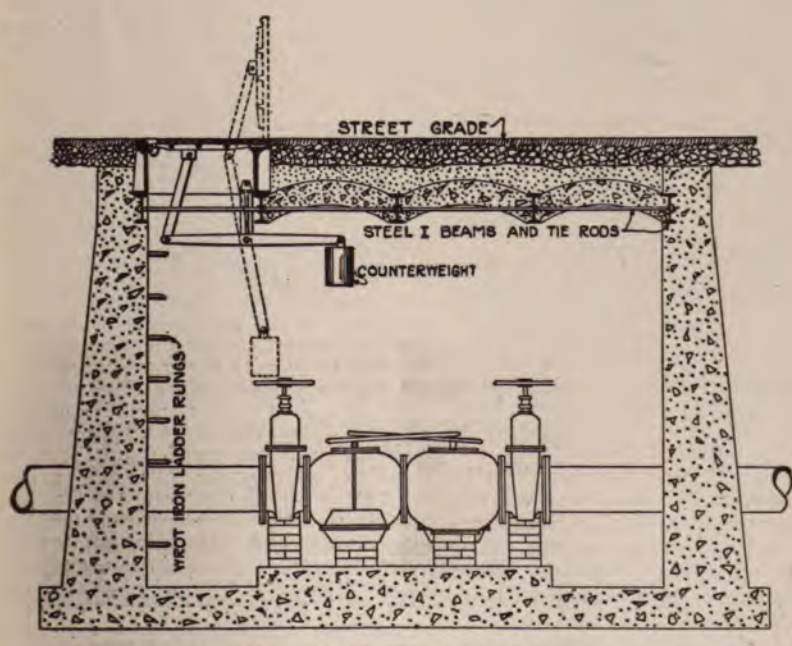
Sloan, Huddle, Feustel and Freeman, consulting engineers, announce that their general offices in Madison, Wis., and their local office in the Peoples Gas Bldg., Chicago, have been removed to the Conway Bldg., Chicago, and that Wm. F. Sloan has assumed personal charge of the eastern office at 14 Kilby St., Boston.

Troop Water Heater Grows in Popularity.

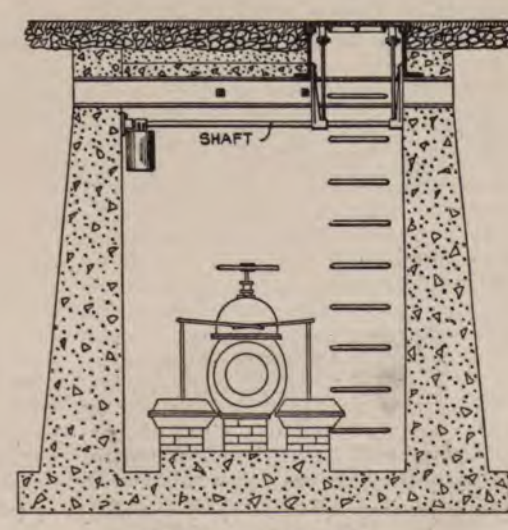
The Troop automatic water heater is growing in popularity under the skilled handling of its new sales manager, W. J. Langenheim. The manufacturers claim that this heater, which has now been on the market over two years, embodies all of the improvements which twenty years of experience have proven necessary to produce an efficient and safe heater and one in which troubles have been practically eliminated. Extreme simplicity and few moving parts is one of the advantages claimed, together with improved patented burners

Troop Automatic Water Heater.

which will neither burn out nor flash back. Literature will be sent upon request, by the Troop Manufacturing Co., Pittsburgh.



LONGITUDINAL SECTION



CROSS SECTION

Balanced Cast Iron Manhole Cover and Frame Developed by Banner Iron Works of St. Louis.

COURTS-COMMISSIONS

Each Service of Combination Companies Must Stand Alone.

In connection with the Guthrie case, the Oklahoma Supreme Court cites the case of Bowe vs. Jacksonville R. & Light Co. No. 2698 and 2698-A, July 11, 1916. Commissioner Shaw, of the Illinois commission, says: "In a case such as the one at bar, where two or more services are furnished under one general management, questions of the allocation of property and operating expenses frequently arise. Equity does not demand that the consumers of one service should be called upon to bolster up the revenues obtained from the users of another class of service. It is axiomatic that, in all fairness, a person should pay for only what he receives; and a user of gas, for example, should no more be called upon to help in the upkeep of an electric light plant owned by the same company, than he should be expected to contribute to the revenue of an independently owned electric company whose product he does not use. To hold otherwise would be to countenance one form of unfair discrimination. The principle applies to the distribution of property between the several departments of a combined utility. Since each service must stand upon its own feet, it must be permitted to earn a return upon all property that properly belongs to it. To assign the property of one department arbitrarily to the service of another might result in grave injustice, inasmuch as the department from which the property is subtracted may thereby be deprived of a return thereon, a result that is clearly confiscation. Doubtless economies may be effected through the combined operation of several plants; but are not the consumers entitled to participate in the resulting benefits. This commission has before it the determination of rates for property operated under a stated form of management which has been in effect for many years previous to this proceeding, and it is not reasonable to suppose that a rate should be predicated upon a different basis of management merely because such method of operation may be possible. To predicate a finding upon conditions which may be imagined to exist, instead of those which are in actual operation, is to enter the realms of conjecture, a basis affording no footing upon which to base a rate structure. Also, so far as the general principle is involved, it would seem an unsound doctrine that the revenues from one class of consumers should be used to increase the earnings of another utility thus exacting tribute from one class of customers for the benefit of another. A utility, inherently, should not be the instrument whereby a fee is exacted for services that have not been rendered."

SPENT $100,000.

Chicago City Council Presents Big Bill for Investigating Gas Rates.

Chicago's gas investigating bill so far this year has been more than $100,000, according to figures compiled by City Comptroller Eugene R. Pike. The total cost to the city of pushing litigation against the Peoples Gas Light & Coke Co. and determining the reasonableness of its rates has been $131,932, according to the comptroller's statement. Of this amount the gas litigation committee of the council spent $123,312 during the eight months. The council committee on gas, oil and electric light spent $8,620 during the same period. Donald R. Richberg, attorney for both committees, was paid $8,299 during the eight months. In addition the committees spent $31,184 for accounting, $85,240 for engineering and $7,208 for other expenses.

Petitions Regarding Rates Must Be Filed Separately.

The Interstate Public Service Co., which controls the United Gas & Electric Co., serving Jeffersonville and New Albany and a number of other towns in Indiana, has withdrawn from the petition of the Indiana Electric Light Ass'n for a 30 per cent. increase in the rates of the members of the association. The Louisville & Northern Railway & Light Co. has also withdrawn from the petition. This petition was filed before the Indiana Public Service Commission, which has ruled that it is without jurisdiction and that the various companies will have to file separate petitions, so that each case may be considered on its merits.

Commission Control of Utilities in Various States.

In re Rules Regulating Gas, Electric & Water Service, Case No. 84, March 22, 1917, the Colorado commission said: "As a result of inquiries made by the commission's engineer it appears that twenty-seven state commissions have prescribed rules regulating the service of public utilities, although only ten have complete control over municipally owned plants. Of the twenty-seven commissions, five require service connections to be made free of charge by gas, water, and electric utilities. These five commissions are California, Idaho, Indiana, Massachusetts, and West Virginia, and of these five states Idaho, Indiana, Massachusetts, and West Virginia have jurisdiction over municipally owned utilities.

Additional Rate Increases Asked by Two More Gas Companies.

The Lebanon (Pa.) Gas & Fuel Co. has filed a new schedule with the Public Service Commission of Pennsylvania providing an increase in rates for gas, for both domestic and industrial use. It is estimated that the new rates will add about 20 per cent. to the revenues of the company. The increase in domestic rates was obtained, as in Danbury, by the use of a service charge not used in Lebanon, being 50 cents gross per customer per month.

The Knoxville (Tenn.) Gas Co. has filed a petition with the city commissioners asking for an increase in its maximum rates for gas used for domestic purposes. The present rate was fixed in the company's franchise.

Furnishing Natural Gas to Schools for Heating.

In the case brought by the Guthrie Gas, Light, Fuel & Improvement Co., and the Oklahoma Natural Gas Co. vs. The Board of Education of the City of Guthrie, the State of Oklahoma et al., the Oklahoma Supreme Court holds: 1. An order of the Corporation commission requiring that natural gas be furnished to the Board of Education of the City of Guthrie for heating the public schools, at a rate different and less from that charged to other consumers, is not, by reason of the discrimination in favor of the public schools alone, invalid; 2. The board of education and the gas company entered into a contract under which the board of education installed a system of heating by natural gas in the public schools, and the gas company furnished natural gas to the board for heating purposes at a certain rate, and maintained that rate for a considerable period of time. Thereafter the rate was changed to a different and higher rate at the request of the supply company from whom the local company obtained the gas, and because the rate furnished to the board of education was discriminatory as compared with rates charged to other consumers, and not because the rate granted to the board of education deprived the gas company of a just return upon its investment. Held, that the evidence showing these facts was sufficient to justify an order by the Corporation commission requiring a rate to the board of education different from and less than that charged by the gas company, in the absence of a showing that said rate fixed by the Commission in connection with the rates charged to other consumers deprived the gas company of a just return upon its investment; 3. By chapter 93, Laws 1913, jurisdiction is conferred upon the Corporation commission over all public utilities, with the power to fix and establish rates and prescribe rules, requirements, and regulations affecting their services and operation and the management and conduct of their business, and, under the powers thus conferred, the commission is vested with authority to make all valid and lawful orders prescribing rates, which the state, in the exercise of its sovereign capacity, could prescribe or make.

ABOUT MEN YOU KNOW

New Officials Take Charge in Port Arthur.

W. E. McClintock, who was recently elected president of the Port Arthur (Texas) Gas & Power Co., has assumed the active management of the company. For the last two years Mr. McClintock has been in charge of the gas and electric plant at Dover, N. J., and several other properties in New Jersey belonging to the National Utilities Co., of New York. He resigned a place on the board of directors of this company to go to Port Arthur. Mr. McClintock before entering the gas business was a consulting engineer in New York.

Ralph Madison, general auditor for the National Utilities Co., went to Port Arthur with Mr. McClintock and he has been made the treasurer of the company. He will remain in the city until all of the accounts of the company are in good condition. Charles M. Scott, who was formerly associated with the National Utilities Co., is now secretary, and is in charge of the accounting department.

M. J. Jackson, who left the company when John C. Connelly resigned as president, is again with the company in the capacity of superintendent. S. B. Redman has also again accepted a place in the office.

Mr. McClintock has announced that his first consideration was going to be the remodeling of the plant in order to have sufficient capacity to take care of the extensions that are to be made in the near future.

Thos. G. Lansden, formerly engineer of the Washington Gas Light Co., died recently at his daughter's home in St. Louis. Mr. Lansden was at one time connected with the gas company at St. Louis and was a founder and president of the Western Gas Association.

William A. Robinson, formerly with the Spencer (Mass.) Gas Co., now is salesman for the Clinton (Mass.) Gas Light Co.

W. S. Guitteau, of Stacey Bros. Gas Construction Co., Cincinnati, is recovering from a severe attack of malaria. Mr. Guitteau spent a great part of the summer in West Virginia erecting oil tanks for B. G. Dawes' Ohio Cities Gas Co.

T. E. Mason, industrial engineer for the North Shore Gas Co., Waukegan, Ill., is one member of the fraternity who richly merits the title he wears. He has been largely instrumental in planting gas in practically all the industrial enterprises in his territory and thoroughly understands the science of salesmanship and the arts of the engineer. He has been with the North Shore company for the past eight years, having come up through the positions of fitter, bookkeeper and shop foreman. He is a member of the Elks and Masons.

T. E. Mason, Waukegan, Ill.

Col. William J. Anderson, for four years connected with the Wisconsin railroad commission, has resigned to enter public utility consultation work in Madison. He will appear before the railroad commission for private utilities, electric, gas, telephone and water power companies.

A. E. Call, engineer of tests for the Island Creek Coal Sales Co., at Minneapolis, now is captain of the 313th U. S. Engineers at Camp Dodge, Des Moines, Ia.

W. F. Doelker, formerly new business manager of the Manhattan (Kan.) Gas and Electric Co., will shortly open an agency for the Delco farm lighting system in that city.

Changes at Greenville, Miss., and Pontiac, Mich.

Edward H. Collins is the new manager of the Greenville (Miss.) Gas Co., succeeding Fred A. Tippy, who takes charge of the Michigan Light Co.'s plant at Pontiac, Mich. Mr. Collins, who also becomes a director in the Greenville company, has been contract agent for the Illinois Northern Utilities Co., at De Kalb, Ill., one of the Insull properties, with which he was connected for the past six years. Prior to that he was for two years with the gas company at Toronto, Can. Chas. U. Gordon, of the Harris Trust Building, Chicago, has been elected vice-president of the Greenville Gas Co., vice Mr. Tippy, while W. P. Delahunt, of St. Louis, continues as secretary-treasurer. B. O. Tippy, of Detroit, is president and consulting engineer.

G. W. Gibson, of Los Angeles, Is Dead.

On the day he was to have celebrated his twentieth anniversary of service with the Los Angeles Gas & Electric Corporation, George W. Gibson, superintendent of employes, passed away suddenly, September 5. When 27 years old Mr. Gibson joined the forces of the gas corporation. His long service entitled him to retirement and benefits, but he did not plan to retire. The gas company's plant which never has been idle, was stilled for five minutes while the remains were lowered into the grave.

J. F. Blandy, general manager and treasurer of the General Gas Mantle Co., has resigned and has been succeeded by J. Wysocki.

Commodore Stewart and Lee B. Mettler, of the American Water Heater Co., St. Louis, were in Chicago last week on business.

O. O. Thwing, of Ft. Wayne, Ind., was in Chicago last week on business connected with the Maxon Premix Burner Co., which he is successfully introducing in many industrial plants of the Central States.

N. R. Gorsuch, superintendent of appliances for the Citizens Gas Co. at Indianapolis, has resigned to accept a position with the Bowser Tank Co. He is succeeded by Wm. Rouke.

Mueller Picnic

The 1917 outing and picnic of the Mueller Mfg. Co. employes, of Decatur, Ill., furnished over 700 people with a day's recreation and pleasure, and the occasion will continue to be a source of happy recollections for months to come. Over 5,000 people visited the picnic grounds during the holiday.

As usual in these events, the day started with a parade from the Mueller plant. The marchers, decked out in special patriotic hats, number 600, with all the women employes bringing up the rear in automobiles. At the park the day's sport was quickly inaugurated and continued without interruption until 11 o'clock at night. Old and young alike imbibed the spirit of the occasion, and gave themselves up to a thorough enjoyment of the athletic and musical programs provided for their entertainment. Members of the firm circulated among the employes and their families, renewing old friends and acquaintances. In the evening there was a dance in the pavilion, music being furnished by the Mueller band. Those who did not dance were entertained with a moving picture show on the lawn. Toys were provided for the children and ice cream soda was served free to all employes, while refreshment stands supplied food to those who came without lunch baskets.

One of the features of the day was the presentation of checks for $500 to three men, Wm. Dannewitz, Louis Wallenbrock and Harry Zetterlind, who have completed 20 years of faithful and loyal service. This took place at noon when Adolph Mueller made a brief speech.

Some idea of the extent and scope of this picnic may be gained from the following list of eatables and drinkables consumed: 130 pounds of hamburger, 23 pounds of wieners, 10 pounds of boiled ham, 1,200 buns (dry variety), 68 ten-cent loaves of bread, 10 five-cent loaves of bread, 60 pounds of peanuts, 20 pounds of salted peanuts, 70 cases of pop, 49 gallons of coffee, 120 gallons of ice cream.

Mueller Parade Preceding Picnic.

Mueller Brothers and Twenty-Year Men.

EXAMPLE OF SERVICE.

Rock Hill Gas Co. Shows That It Merits the Vote of Confidence It Received.

As related in the last issue of THE GAS RECORD, the voters of Rock Hill S. C. elected the Rock Hill Gas Co. a member of the Desirable Citizens' club recently and permitted it to raise its rates for gas by 25 cents per 1,000 cu. ft. An incident that followed close on the heels of that interesting event throws a flood of light on the real cause of that community's gratifying attitude. It hinges on the gas company's readiness to serve the people of Rock Hill at every possible opportunity.

The chamber of commerce in Rock Hill organized a movement to establish a community cannery in the general food conservation campaign. Steam from a neighboring laundry was used as the principal heating element until the laundry management found the enterprise was using all its steam. Then the cannery was cut off and left without any fuel for cooking. Manager E. R. Guard had made an attempt to install gas apparatus in the cannery from the outset, but was turned down because the laundry steam was considered by the management the most economical. When the crisis came, however, he was on the job again with both feet.

"How soon can you install gas?" he was asked.

"Right away," was his reply.

"Go to it," was his orders.

He went right to it. It was three o'clock in the afternoon and they had about seventy bushels of materials for preserving and canning. Manager Guard installed three Johnson blast burners in the wood-burning canning outfit and also two Johnson bench furnaces to take care of the soldering and tipping irons. By night the installations were complete and the canning started up again next morning. In three weeks over 5,000 cans of different kinds of vegetables were sealed and stored for future emergencies, and the work is still going merrily on.

The N. C. G. A. advertising posters and literature is used extensively in Rock Hill and the town is all worked up over the food conservation movement as a result.

"For the past three weeks," says Manager Guard, "our send-out has almost doubled that for the same period last year."

Guy Veatch, formerly with the Union Gas & Electric Co. at Bloomington, Ill., now is with the Elkhart (Ind.) Gas & Fuel Co.

W. F. Booth, manager of the Little Rock (Ark.) Gas & Fuel Co., was in Chicago last week on business.

Harry Schutt, general manager of the C. H. Geist Gas & Electric Syndicate, Philadelphia, and Walter Schutt, commercial manager of the St. Clair County Gas & Electric Co., East St. Louis, Ill., were called to Beloit, Wis., recently by the death of their father.

(*Continued from Page* 184)

the highest per capita gas consumption. May I suggest to the managers present that now is the most propitious time to thoroughly analyze conditions prevailing along your existing lines of main with a view to increasing your present output and bringing your plant and distribution system up to the highest efficiency, rather than sitting by content and making only a feeble effort towards securing new business. The development of present mains and services does not necessitate so large an expenditure of capital and labor as does main extensions. Intensive development of existing equipment is our business and duty.

Achievements of the Association—Future Opportunities.

John A. Britton, early in the history of the association, conceived the idea of establishing a Degree in Gas Engineering, to be included in the curriculum of the University of California, but not until our nineteenth annual meeting at Oakland in September, 1911, did the seed finally take root. Before this convention adjourned, voluntary subscriptions were received from our members in which they obligated themselves to support such action on the part of the University of California for a period of five years. As shown by the report of our secretary the, association's final payment now has been made to the University, an amount aggregating $12,115. We should not, however, stop at this point, for we owe it to ourselves and to our association to continue active interest and I bespeak such co-operation from the members Our new memberships show a healthy growth and that always is a good omen in any organization. It is the duty of every member to bring in at least one new member yearly, for our future success depends largely upon the infusion of new blood. The matter of our association affiliating with the American Gas Institute has come up from time to time in the past, but no definite arrangements have ever been made. In view of present conditions, much more could be accomplished by our association if it retained its own entity and yet was affiliated with the Institute. Many of our problems are not similar to those in the Eastern states, yet in national legislation and immediate matters of helpfulness in providing new rules and regulations for our industry and in the matter of the B. t. u. content for gas, we could be helped a great deal by the affiliation suggested. In other words, great help could be derived by the consolidation of all interests of our character in the United States. The subject, however, is a broad one and we think does not permit of hasty judgment. It therefore is suggested that complete information covering this matter of affiliation be prepared and sent to every member of our association in order that whatever action may be determined upon will be in accordance with the desires of the majority of our members.

During these times when many of our members are responding to our country's call, I suggest that action be taken toward remitting the dues of such members. This is the least we can do as an organization to show our appreciation and is a privilege of which we should avail ourselves. Life membership in our association also should be made possible to such of our members who may desire to avail themselves of this privilege. It is a peculiar fact that the conferring of honorary membership upon a man immediately abrogates the recipient's powers as an active voting member. This condition, in my opinion, should not exist. There are some of our members upon whom the conferring of honorary membership is merited because of some special service to the industry, but an actively interested member would not care for an honor which takes away more than it gives.

After thanking the chairmen of his various committees, officers and board of directors for their co-operation during the year and expressing his appreciation to those who gave their time and thought in the preparation of the papers read before the convention, President Babcock, in conclusion, left this parting thought: The Sales Department of the gas business must have more power, must be more considered, must be composed of a more capable personnel. Then, with full co-operation and understanding existing between executive heads, engineers and sales managers, there is no limit to future progress.

ADVERTISING GAS.

Furniture Dealer Tells Pacific Coast Men How More Gas Can Be Sold.

A. L. Crane, representing the Furniture Dealers' Ass'n. of the Pacific Coast presented to the members of the Pacific Coast Gas Ass'n. a paper on the merchandising of gas that is the furniture dealer's idea of how more gas may be sold through a closer co-operation with the furniture dealers of the community. Mr. Crane pertinently points out the defects in advertising and sales policies of some gas companies. In referring to successful advertising campaigns he says:

"One of the most notable of the advertising campaigns which I can use as a demonstration is that of the Standard Oil Co. campaign of advertisement for Perfection oil cooking and heating stoves. As you undoubtedly remember, Mr. Morris, of the Holbrook-Merrill & Stetson Co., who addressed the convention for the combined interests of the manufacturer, jobber and retailer, at the last convention, stated that in Southern California, outside of the City of Los Angeles (and you all know Southern California is the gas field of the state of California), that the increased sale of coal oil stoves was over 500%."

"See your dealer," states Mr. Crane, has been so featured in household utility advertising that the gas company is far from being the first place to which a woman comes for her domestic work-shop needs. The local advertising of gas companies does not fully remedy this condition, according to his statements, because the furniture dealers are still the heavier advertisers in the home newspapers.

The conflicts between gas companies and furniture dealers in some places is illustrated by several representative cases, and commented upon in a logical manner. Mr. Crane tells that, as the result of these misunderstandings the sale of gas appliances has been discontinued altogether by several western furniture stores that had done considerable business in this line.

The house-to-house method of canvassing is condemned as wasteful and distasteful to the prospective purchaser. As furniture is sold to a person only once in a lifetime, continues Mr. Crane, the furniture dealers' employ the best class of salesmen, do the most advertising (investment considered), and employ every attraction of modern merchandising to boost sales.

The annexation of furniture dealers to the gas companies' selling organization would result in a stiffer competition to the growing business of electrical companies, according to Mr. Crane, although he fails to show how a gas appliance would get stronger featuring than an electrical appliance at the hands of a furniture dealer.

The combination range is given a strong boost in this paper, the author stating that upon checking up a number of combination ranges he found that 80% of the fuel that was used was gas.

As a furniture dealer, the actions that would result in an increased sale of gas, are given by Mr. Crane as follows:

"That the dealers throughout the state be notified that the gas company will surrender the sale of appliances just as soon as is possible for the dealer to take over the work and create an increased use of gas.

"That the convention recommend to the appliance manufacturers a national campaign of publicity.

"That the convention recommend to the various gas companies throughout the state that experienced advertising men be placed in the field to educate the dealer, who at the present time, is not in a position to employ advertising service, as the best methods for developing his territory.

"That efficient window display be prepared and sent from point to point.

"That cartoon movies be made and loaned to the dealers wherever it is possible to secure the co-operation of the local movie house.

"That a demonstrator be employed who can demonstrate efficiently the best methods of the use of gas appliances,—said demonstrations to be made in the various windows of the members of the furniture dealers association, or in the windows of anyone who is merchandising stoves."

George Herbert Manley, of the Test Department of the Baltimore Consolidated Gas & Electric Co., was killed recently in France, where he was serving in the aviation corps.

The Hotel Range

Pacific Coast Expert Says It Must Be Further Improved to Suit Chef

By Wm. E. Dugdell

(Abstract of Paper Read Before Pacific Gas Association)

From data obtained in some twenty odd towns on the Pacific Coast it was found that the volume of hotel and restaurant fuel business awaiting us was sufficient, if secured, to increase the gas company's output from fifteen to twenty-five per cent. It was further determined that fully ninety per cent. of hotel and restaurant owners were really anxious to use gas exclusively, and for this privilege were willing to pay a reasonable bonus above the cost of other fuels and their attendant items of expense. In spite of these favorable conditions, however, we find that on an average the gas interests have obtained less than thirty per cent. of the possible business in this field. Bearing in mind the fact that it is now some ten or twelve years since the first serious efforts were made to develop these sales, this percentage appears entirely too low. Whether or not this condition prevails in other sections of the country I am in no position to say. It probably, however, is typical, as these towns ranging in population from five thousand to two hundred and fifty thousand are no doubt more or less representative of the general order.

Fuel User Skeptical.

While these fuel users evince a desire to use our product, they are possessed of a doubt as to its adaptability and probable cost. It naturally follows, that if we are to enjoy the full revenues to be derived from this source, the removal of these doubts rests entirely upon the shoulders of the gas fraternity. Whether we are in a position today to accomplish this desired result is very questionable. Aside from the educational features, the development of these sales rests principally upon three factors:

First—The offering of attractive rates.

Second—The development of more efficient appliances.

Third—Service.

Are low rates the logical solution? Personally, I think not, and will venture the statement that they will never solve our hotel and restaurant fuel problem, for low rates to the writer's mind encourage waste, and retard the development of efficient appliances. I believe we have reached a point where the maximum development of this business will depend largely, if not entirely, on the development of more efficient appliances.

Our present types of hotel ranges have served their purpose to a limited extent; their adaptability has been determined almost entirely by the rate paid for gas, and each type has had its particular place in this field. Few of them, however, are constructed to conform with the methods to which most cooks have been educated in preparing large quantities of food for public consumption, and, with the exception of the open top range installed in the straight short order house, few if any of them are really practical for all round cooking.

The education of a cook in the economical use of gas is for the most part more or less of an impossibility. Few of them when practical will avail themselves of the opportunity to economize thru the unit system of ranges.

Gas Most Sanitary.

Gas is without question the most sanitary fuel in the commercial world today, but a chain is only as strong as its weakest link. The average hotel unit is not constructed on sanitary lines, there are too many cracks and crevices, too many valves and air mixers, grates, drip pans and trimmings, on which grease accumulates and is seldom removed. Attempts at frying steaks on top plates of these ranges results in grease running down the sides between units where it cannot be reached or saved, and I have known of cases where fires resulted from this source. The solid top French range with its smooth surface and trough for catching grease overcomes this. In this manner the grease may be saved, and made into soap thereby effecting additional economy.

To the writer's mind it appears far more logical to build a range to meet with the chef's requirements, than to attempt the impossible feat of converting thousands of cooks to new methods which their very nature causes them to resent, and I am firmly convinced that the gas range that will meet with their entire approval and afford them the same service to which they have been accustomed is still to be developed.

The Desired Range.

This range will have to be of a solid top with one fire control permitting ovens to be heated at all hours, and water heating facilities combined and constructed on sanitary lines. Its thermal efficiency must be such as to permit its use at rates generally prevailing throughout the country. The human factor that now plays such an inportant part in determining these fuel bills must be removed as nearly as possible, and it is necessary that we protect the cook against himself. Can such a range be produced?

Insofar as the writer is aware the development of the present type of hotel range has developed almost entirely upon the manufacturers: At least it is certain that full use has not been made of the knowledge and experience of the engineers, chemists and hotel salesman connected with the gas companies. Had there been a fuller co-operation a more efficient appliance must have resulted, and I strongly urge upon this association the desirability of the appointment of a committee to collaborate with manufacturers with a view to producing a type of range which will enable us to secure the hotel and restaurant business without having to resort to unreasonably low rates.

Service as the writer sees it is a commodity. It is that for which the consumer pays the difference in price between gas and other fuels. It is "Service" that actually makes the sale of gas possible to a hotel or restaurant. When we place one of these consumers on our ledgers, we assume their entire fuel responsibilities. Their success depends largely on fuel and to that extent their success depends on the service we render. To render efficient service when the volume of business warrants, a department should be established for the sale, installation, and maintenance of these appliances. By this method the gas company can keep in closer touch with these large consumers and advise them in the purchase of appliances, as the rendering of efficient service depends largely on the type of appliance installed.

Best Possible Field.

A study of this field can hardly fail to convince one of its magnitude and importance. Here we find a most desirable class of consumers in a sense actually soliciting us, and I know of no other field offering an equal volume of new business wherein the saturation point may be reached in as short a period of time under proper conditions. With efficient appliances I will venture to say that it should be possible to reach this point in from three to five years time. Under existing conditions, however, our efforts for the most part must be confined to three types of hotels and restaurants:

First—The straight short order house using the open top range.

Second—The extremely large hotel in a position to pay a large bonus for service, and to which our more attractive rates may be applied.

Third—The small owner doing his own cooking who by conservative use finds gas within his purchasing power.

The chief factor of success in all ventures is enthusiasm. "Enthusiasm, guided by reason of experience becomes a noble passion that prompts to the ardent pursuit of laudable objects. Such is the enthusiasm of the poet, the orator, the painter and the sculptor. Of the patriot, the hero, and the Christian."

These Auto Tours Include Lake Trip.

Near the close of the summer season is the ideal time for a motor trip, and many motorists are now en route. The ever popular "Motor-Steamer" trip for those traveling either east or west is again attracting a multitude of tourists. The reason for this is very apparent, for with the new $5 round trip rate and special service provided for automobilists between Cleveland and Buffalo by C. & B. Line steamers, the tourist can break the monotony of the land journey, enjoy a comfortable night's sleep on Lake Erie, make progress of 183 miles on his journey and awake refreshed and eager to resume his auto trip early the next morning. This $5 round trip rate is made for automobiles 127 inches wheelbase or under (over 127 inches wheelbase, $9) good for return within two days. C. & B. Line steamers leave Cleveland and Buffalo daily at 9:00 p. m., reaching destination following morning at 7:30.

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Benzol and Toluol Recovery

How Great Britian Mobilized the British Gas Companies and Obtained These Products for the Making of High Explosives—Processes Used

By Our British Correspondent

In the work of the organization of the production and supply of high explosives in Great Britain for the prosecution of the European war, the name of the Rt. Hon. Lord Moulton, K.C.B., F.R.S., stands indisputably foremost. When war broke out he was summoned to take the control of this work of organization, and became, and still remains director general of explosives supply of the ministry of munitions of war. His keen and unmistaking appreciation of the requirements of the situation and his wonderful discernment of the most direct means of meeting them were quickly in evidence.

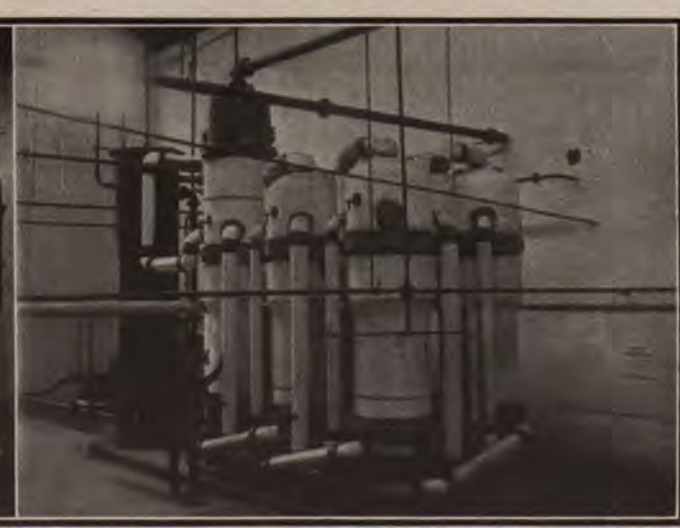
One of his first acts was to get into touch with the leaders in the gas industry. This was done through the Institution of Gas Engineers. A committee was appointed consisting of the then president, John Bond, engineer of the gas department of the Corporation of Southport; Dr. Charles Carpenter, chairman of the South Metropolitan Gas Co.; the late Edward Allen, engineer the Liverpool Gas Co.; Alexander Wilson, engineer the gas department of the Corporation of Glasgow; John Young, engineer the Hull Works of the British Gas Light Co.; T. Glover, engineer the Norwich Works of the British Gas Light Co.; H. O. Carr, engineer the Wandsworth Gas Works; J. H. Canning, engineer the Newport Mon. Works; and J. Smith, engineer the gas department of the Corporation of Belfast.

The duty of this committee was to make known to all the gas engineers of the country and to supervise the working of a new process devised by Dr. Carpenter for washing coal gas with tar in order to increase the toluol contents of the tar.

Early Propaganda Work.

The early work of these pioneers consisted in addressing meetings of gas engineers in all the various districts of the country to explain to them the process, which became known as

Rectification Plant in Benzol House.



Crude Still in Benzol or Toluol House.

the "C" process. It is capable of ready application to existing gas plants, and the results obtained from its use were important in the highest degree. Experiments were made which showed that by its application a most substantial increase in the toluene contents of the tar, produced by the distillation of coal used in gas undertakings could be obtained without the necessity of additional plants, in the majority of cases, other than of the most trivial character.

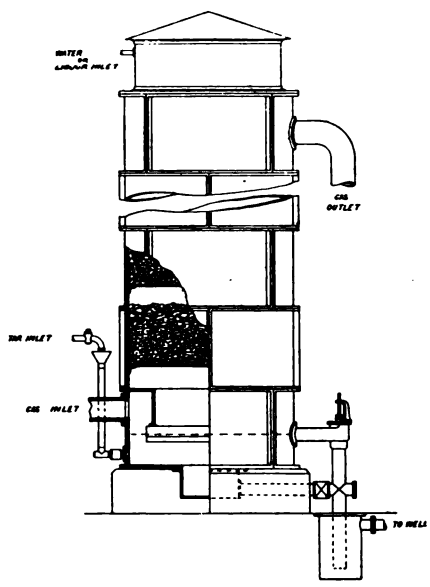


Fig. 1. Apparatus for "C" Process.

An urgent communication was addressed to the gas authorities, pointing out that in view of the national importance of obtaining the largest possible amount of toluol for the manufacture of high explosives, it was essential that the process should be immediately adopted and brought into operation at the earliest moment.

Operation of the "C" Process.

The gas is washed with coal tar at a temperature of approximately 60 deg. Fahr. Most gas engineers have a certain amount of washing plant which can readily be utilized for the process, and all that is required is a constant stream of tar passing through the washing or scrubbing plant so that the gas bubbles through or comes in close contact with the tar. The rate of flow through the washing plant is approximately the rate at which the tar is made, or one gallon per 1,000 cubic feet of gas.

In cases when the make of tar from all apparatus used in gas manufacture flows into one tank, which tank also receives the ammoniacal liquor from the washing plant, it was recommended that the tar from this tank should be circulated through the washing plant at the rate of two to three gallons per 1,000 cubic feet of gas until such time that the make of tar can be passed directly through the washing or scrubbing plant, which is the preferable method.

It is most important that the tar should contain as little water as possible; also that both the gas and tar should be at a temperature of approximately 60 deg. Fahr. The tar if too thick can with advantage to the process, be thinned down by the admixture of a small percentage of creosote oil. The washing should be effected between the condensers and ammonia scrubbers.

The washing of the gas does not appreciably affect the illuminating power of the gas, but the calorific value may be reduced 10 to 15 B. t. u. In cases where illuminating power of calorific values are governed by an act of Parliament and the tests fell below the statutory requirements in consequence of the adoption of the process, any question which was raised was referred to the department of explosives supply, which took the matter up with the authority concerned. Under the special circumstances, the usual penalties for failing to conform with Parliamentary requirements were not enforced.

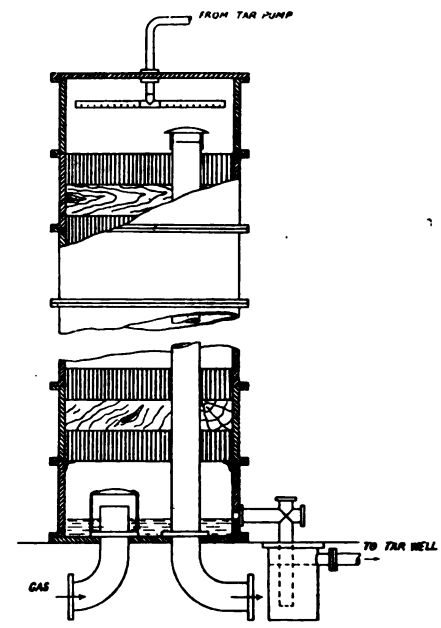


Fig. 3. Apparatus for "C" Process.

The illustrations given in Figs. 1, 2, 3 and 4 of four typical methods of

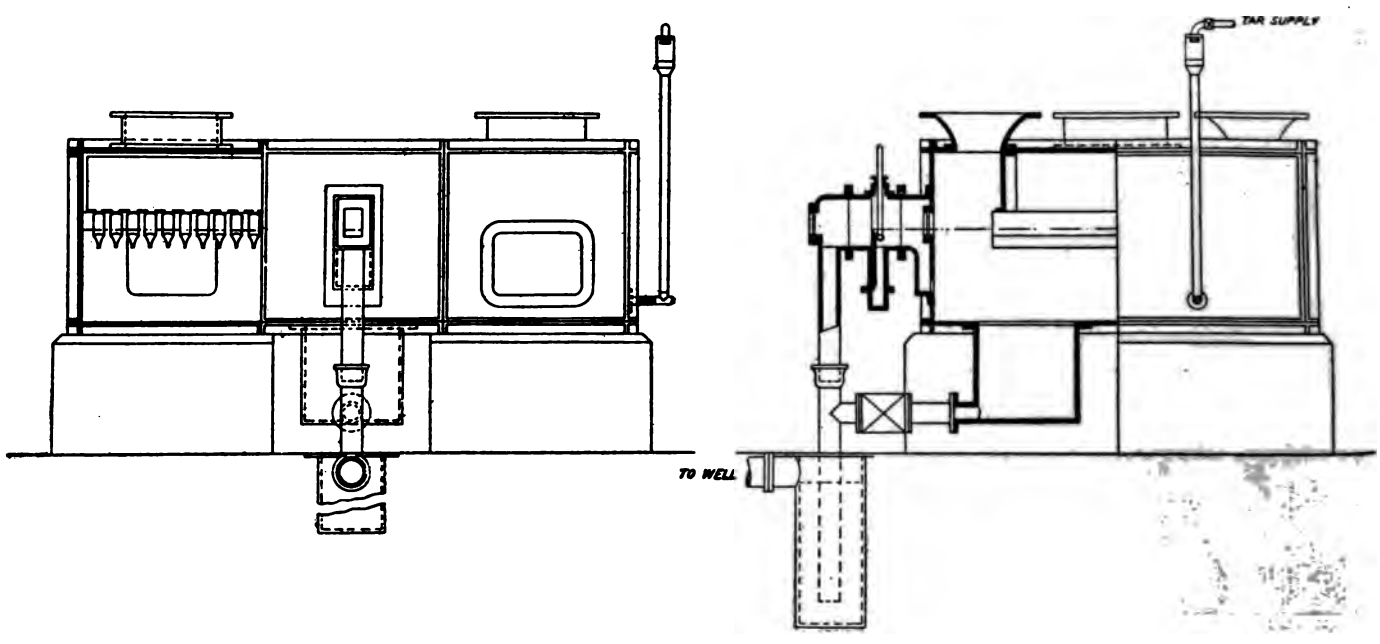


Fig. 3. A Typical Equipment for Applying the "C" Process.

applying the "C" process, were issued with the particulars.

Naphthalene Troubles.

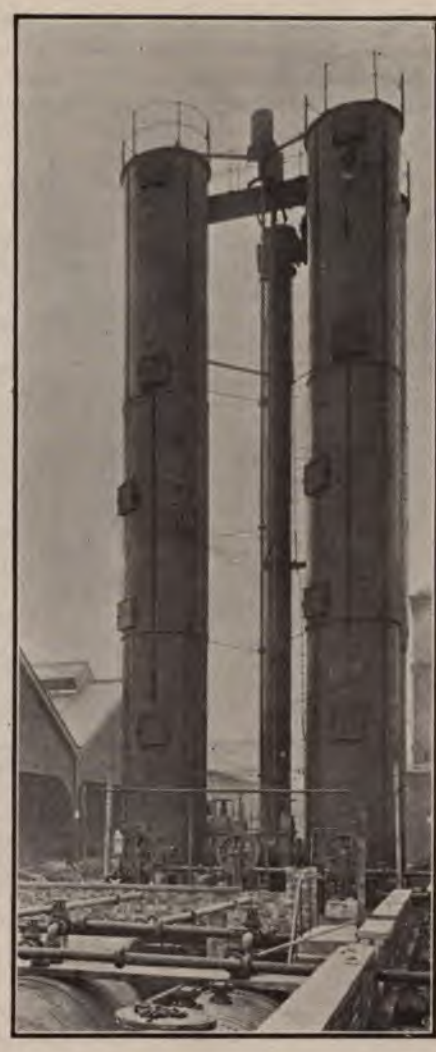
Since this process was started some districts (not all) have been more troubled than usual with deposits of naphthalene. Cumulative evidence goes to show that those troubles are probably due to the tar-washed gas (of lower vapor tension) picking up naphthalene which was already in the mains and depositing it again in the smaller and probably cooler service pipes at certain seasons of the year.

Results of the "C" Process.

The results obtained by the "C" process show that on an average the toluol contents of the tar have been at least doubled, but the rate of extraction by undertakings which have been able to work closely in accordance with the recommendations of the ministry of munitions has been largely in excess of this figure. In particular, the case of the Valley Road Works, Bradford, may be mentioned where the toluol contents per ton of tar showed at one time an increase from approximately 1¼ to 6 gallons; and also the case of the Great Western Railway Works, Swindon, where a somewhat similar result was obtained.

Organization.

In organizing the introduction of the process, the kingdom was divided into seven areas, each of which was placed under the supervision of one of the above named engineers. These areas were for the most part subdivided into counties or districts and supervised by an engineer of the district. As a result, the process within a short space of time was in operation at about 600 gas works in the kingdom, comprising almost every works where the arrangement of the existing plant permitted its adoption, and within six months of its introduction it is safe to assume that out of 16,000,000 tons of coal carbonized at gas works per annum, the gas from 12,000,000 tons was being treated by this method.



Tower Scrubbers for Light Oils.

Laboratories have been established at the Universities of London, Glasgow, Leeds, Newcastle, Birmingham, Manchester and Bristol, which serve as testing stations for the works situated in their respective areas and to which two samples of tar are sent at intervals from all works, one of the ordinary make of crude tar, and the other of tar which has been treated by the process. Thus the increase in the toluol contents of the tar from all the works in question is periodically ascertained, and in any case where the results are considered unsatisfactory, the matter is immediately taken up by the engineer in charge of the district in which the particular works is situated with a view to making suggestions for securing a better extraction. The results of tests tend to show that the total toluol contents of tar produced at gas undertakings alone has increased by approximately 1,500 tons a year.

This result would have been impossible to achieve without the energy and enthusiastic assistance of the 40 leading gas engineers who have given, and are still giving, so much time to the extension of the process, and to showing how at each works the existing plant can be adapted to the best advantage. These engineers have lost no opportunity in stimulating the interest of the industry, with the result that at the present time there is evidence throughout the country of a keen desire to cooperate and assist the ministry to the fullest possible extent. The total out-of-pocket expenditure voluntarily incurred for new apparatus and connections has probably reached $500,000 for this process alone.

Direct Recovery of Crude Benzol.

Previously to the introduction of the

A Toluol Plant in England Showing Scrubbers and Condensers.

"C" process, the high explosives department arranged to negotiate with some of the larger gas undertakings with a view to the adoption of the process similar to that in operation at the majority of coke oven installations for the direct recovery of crude benzol from the gas by scrubbing it with oil.

From the carbonization of coal only a small proportion of the toluol remains in the tar, and probably on an average 80 per cent. goes forward in the gas. At the time of the outbreak of war the distillation of tar was the sole method of recovery of toluol from the coal carbonized at gas works. To ensure as large a quantity as possible being distilled, the road board agreed to bring pressure upon all local authorities to use only refined tar for road purposes, that is to say, tar from which the low boiling fraction containing toluol had been distilled. The principal waste of toluol from tar was thus obviated, and gas works were forced either to dispose of their tar to a distiller or else to erect tar dehydrating plants for the recovery of the light oils (containing the toluol fraction) before selling their tar locally.

The crude benzol obtained by the direct recovery process is re-distilled and fractionated and yields benzol, toluol and solvent naphtha. The chief difficulty that has to be faced was the fear that the diminution in the quality of the gas, in particular of its illuminating value, which is very much more affected by scrubbing than is its heating value, would result in serious complaint from consumers and loss of customers. It was originally agreed, therefore, that the gas at the works where plants were to be erected should be carburetted, not only with the benzol recovered in course of obtaining the toluol, but also with such an additional amount of benzol as might be necessary to maintain the illuminating and heating standard of the gas at the same level as before the toluol had been extracted. Agreements on these lines were negotiated with the gas undertakings of Birmingham, Coventry, Edinburgh, Glasgow (two works), Leeds, Manchester, Newcastle, Sheffield (two works), Sunderland and Tottenham.

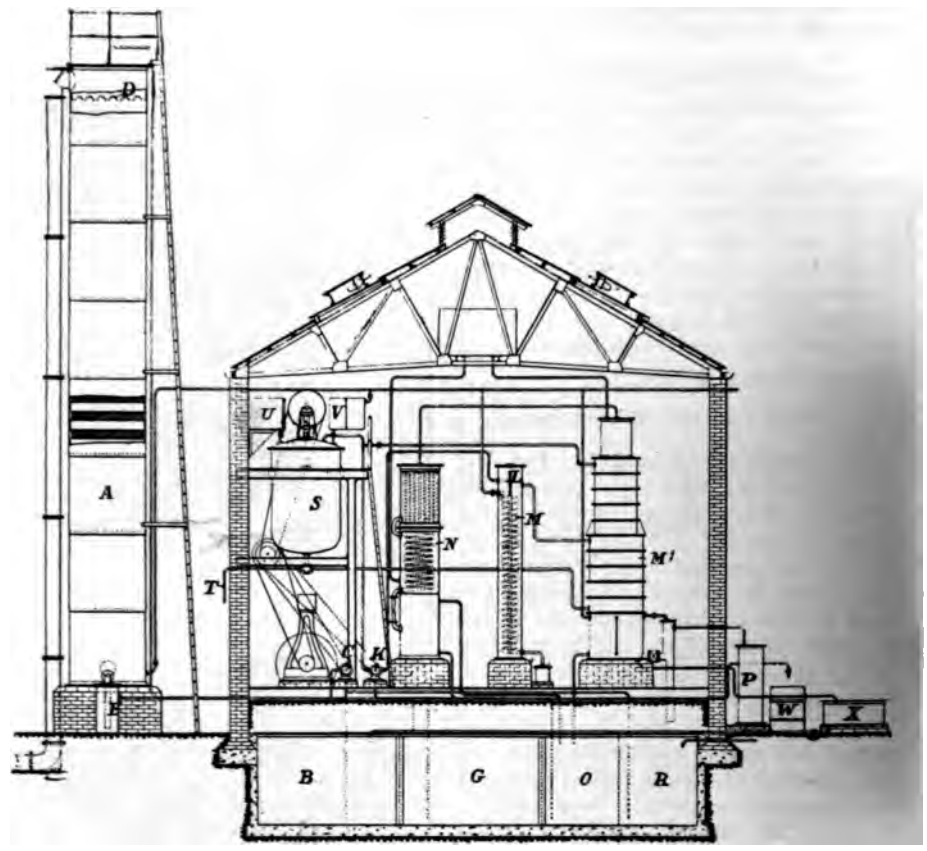


Fig. 5. Benzol and Toluol Recovery Plant.

The process from these 12 plants was expected to yield 400,000 gallons of toluol a year, and it was estimated that an equal quantity of benzol would have to be provided as a substitute. Work upon these plants was commenced in March, 1915, and on an average from eight to nine months was required to complete them and bring them into operation. Photographs of these plants are given herewith.

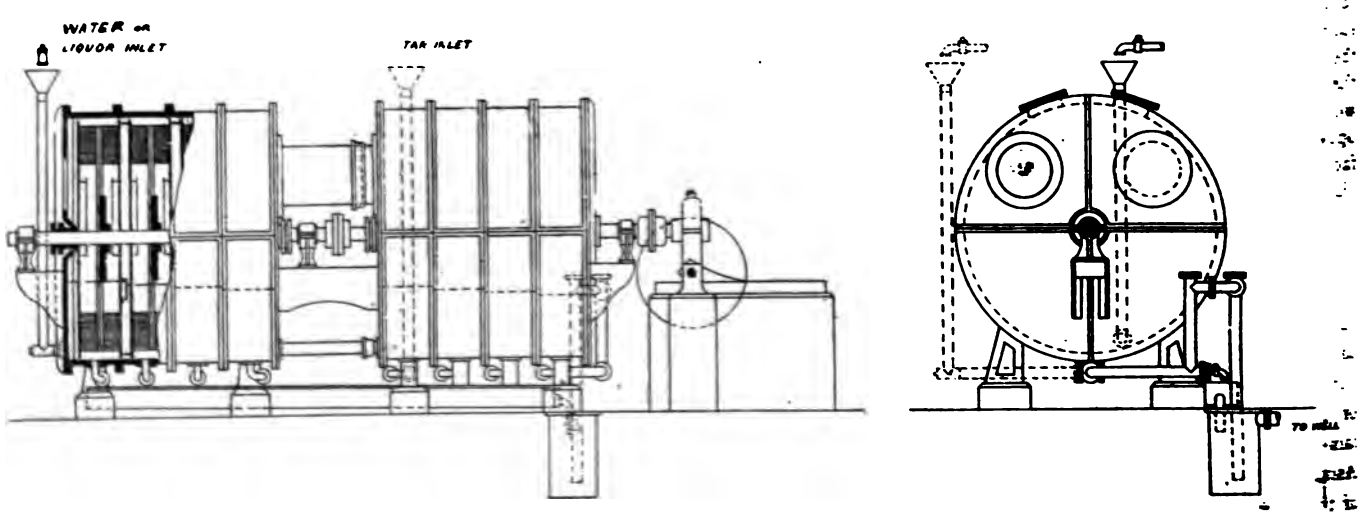


Fig. 4. Another Type of Equipment for the "C" Process of Recovery.

ı August, 1915, the benzol require-
ıts for explosives became extreme-
ırgent and it was obvious that not
/ would it be impossible for the ex-
ıives department of the ministry of

Vertical Brush Washers in One of the British Plants.

itions to fulfill its undertaking to
ıce the toluol extracted by benzol
ıe 12 works where direct recovery
ts were being installed, but that it
ld be imperative for the depart-
t to take the considerable quantity
ɔenzol (estimated at approaching
),000 gallons per annum) which
ld be produced at the same time,
by the same plant, as the toluol,
which it had been originally agreed
ıld be put back into the gas. On
ɔther hand this extraction from the
could not be carried out unless
e efficient gas enricher could be
d, seeing that any diminution in
quality of the gas, particularly in
:ase of very large works concerned,
ld have a very serious effect on the
ations carried on at a number of
ɔries engaged on munitions of one
or another.

ıriching the Toluol-Denuded Gas.

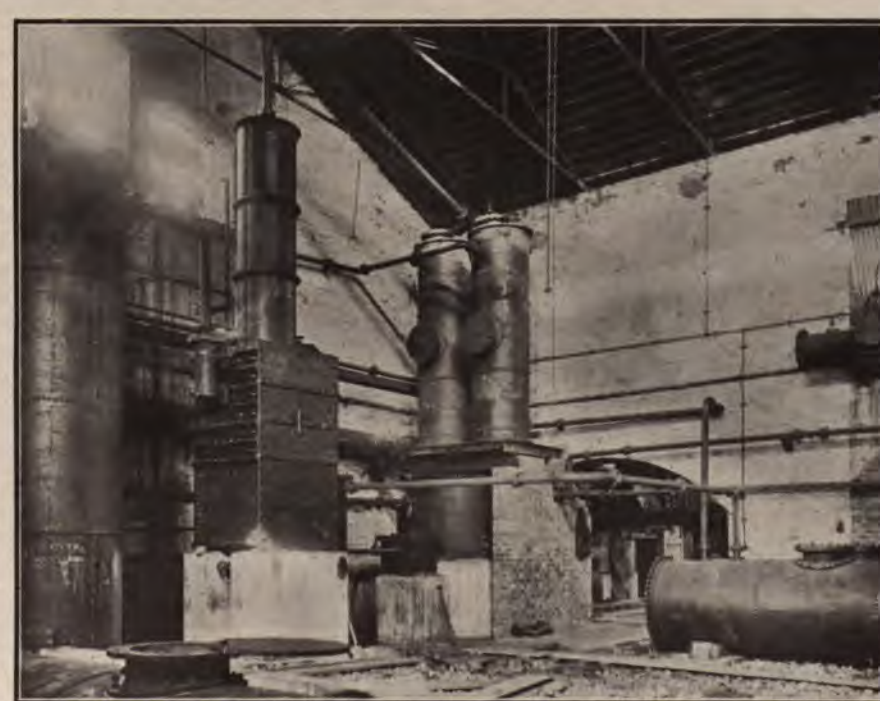
ıere was a doubt as to whether any
titute could be found which would
the efficiency of benzol as a gas
:her. However, as a result of tests
petrol spirit which could be ob-
:d in the required amount from the
tic Petroleum Co., a gas enricher
ıe necessary low boiling point was
d which the gas undertakings con-
cerned agreed to accept and by the supply of which, therefore, the above-mentioned quantities of toluol and benzol became available. None the less in actual practice the gas undertakings concerned have been forced to submit to some slight reduction in the value of their gas, the proportion of enriching spirit with which they are provided against deliveries of toluol and benzol being insufficient to restore it to the same level as before washing.

Independent Benzol Recovery Plants.

With the steadily increasing requirements of benzol becoming generally recognized by gas committees, certain undertakings eager to render the maximum assistance in their power, erected benzol recovery plants independently of government help, as far as possible out of spare pieces of apparatus already in their possession. The undertakings in question were those at Bournemouth, Southport, Falkirk, Wandsworth and Wombwell, where it was intended to carry out the process of stripping only as far as could be effected without undue impoverishment of the gas. No enriching material was to be used, in fact none was available, but in all these cases it became apparent that a substantial recovery of benzol could be afforded without much inconvenience to consumers in the areas concerned.

Development of the Oil Washing.

Interest in the oil washing process continued to grow, and the experience of the undertakings mentioned above removed to a large extent the apprehensions that existed on the effects of its introduction. As a result, with the help of comparatively small contributions from the government towards the costs of the apparatus, the gas works at Bradford, Swindon (G. W. R. Works), Brentford, Norwich, Etruria and Guildford proceeded with the installations of plants. In these cases also no enriching material was to be given, and the arrangements conclud-



Interior of Crude Benzol Plant.

ed represented a very large saving in the cost to the government of the original 12 plants that had been erected.

It gradually became established that from one to two gallons of crude benzol containing on an average 65 per cent. benzol and 15 per cent. toluol per ton of coal carbonized, could be recovered without serious inconvenience to consumers.

Effect on Quality of Gas Measure.

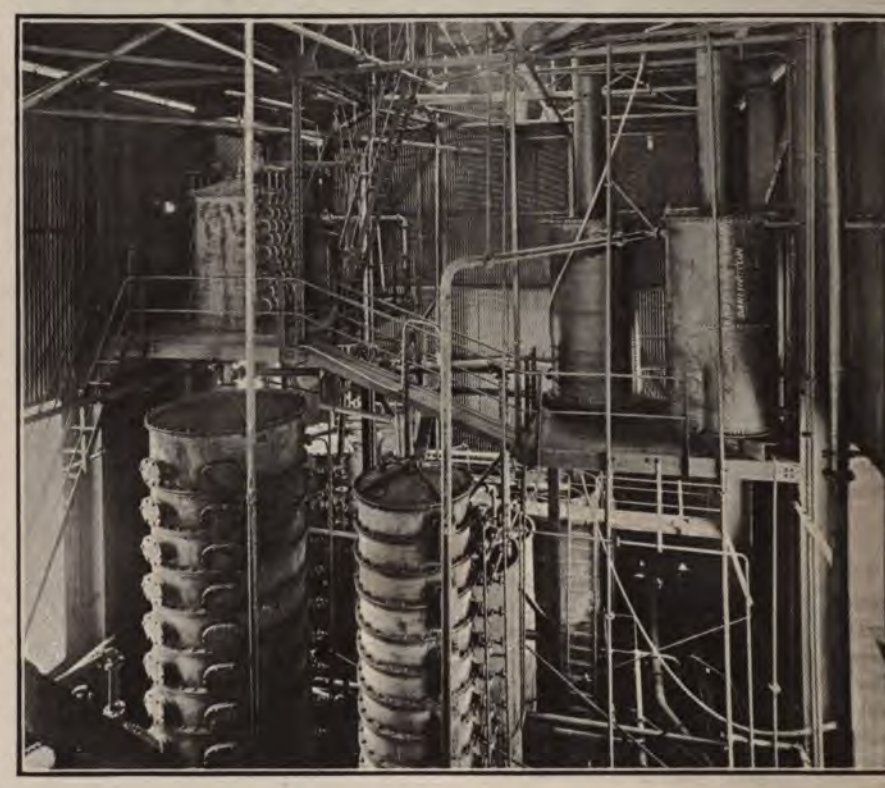
Although with the increased use of incandescent burners the illuminating value of gas has become a matter of minor importance, none the less a large majority of companies must supply gas complying with a fixed illuminating standard. Experience proved that whereas the reduction in calorific power of the gas by complete stripping was not reduced by more than seven per cent., the illuminating value of the gas could be largely destroyed. During the war all processes of stripping are carried out by order of the minister in exercise of his powers under regulation 8 (a) of the defence of the realm consolidated regulations, and this order is held to relieve the companies of any forfeiture or other penal consequence in case the necessity of complying with it causes any failure to keep the gas up to the standard imposed by law.

Thus the prospect that a benzol plant would become useless at the end of the war when statutory obligations in regard to the value of the gas being supplied are restored, was the big obstacle which had to be met when urging additional companies to erect benzol recovery plants on their own account. Accordingly the board of trade was moved to introduce a measure (gas, standard of calorific power) which authorized the substitution of a calorific standard for an illuminating standard by order of the appropriate government department, and the bill provided that in considering the expediency of making such an order, the department should have special regard to whether the companies have erected, or are prepared to erect, suitable benzol recovery plants for the production of benzol and toluol. This bill speedily became law and had the desired effect. Approximately 70 works now are installing benzol recovery plants without assistance from the government and the number continues to grow.

There are no figures to show the production of benzol and toluol from gas works previous to the war, but (the sole source being that quantity of tar which was disposed of to distillers) 5,000 tons of benzol and 1,000 tons of toluol per annum is probably not very wide of the mark. The two processes which have been put into operation have probably increased these figures by 25,000 and 4,500 tons respectively, and the ultimate increase when the new plants under erection come into operation should equal 33,000 tons of benzol and 5,000 tons of toluol.

Supervision of Tar Distilleries.

With the object of preventing all possible loss of the required materials, the inspection and supervision of tar distilleries, particularly the smaller ones, and tar dehydrating plants at gas works, is carried out under the direction of the explosives department of the ministry of munitions.



Interior of One of the Large Toluol Plants in England.

The Interest of Small Works.

The possibilities of what may be done by small works in the recovery and refining of benzol were described by D. Bagley in "The Gas Journal" of June 19th last. He pointed out the necessity of producing benzol of a high standard quality. In his proposals he has introduced a method whereby crude benzol may be rectified in a part of the apparatus utilized for separating it from the wash-oil by certain modifications to it, so avoiding the loss of wash-oil sent away in the crude when refined at a separate distillery.

The illustration which accompanied the description is reproduced in Fig. 5, and is diagramatic in form. The scrubber A, into which the benzol-containing gases are first conducted, is fitted with hurdles designed to give the least resistence to the gases, and avoid any radical alteration to the exhausters. A tendency has been observed in recent proposals to substitute other contact-mediums for the hurdle, which apparently neglects the back pressure exerted and the concomitant expenditure of power (increasing with the service period) to which may be added the inherent difficulty of effectively utilizing the increased surface. Wash-oil is drawn from the tank B by the pump C, fitted with devices for automatically determining the quantity of oil forced to the scrubber. The wash-oil is distributed within the scrubber by the corrugated diaphragm D provided with a number of distributing slots so as to ensure a uniform flow of oil over the hurdles. The benzolized oil flows through the seal E to the receiver G. The pump K, fitted with automatic regulating devices, draws the benzolized oil from the receiver, and forces it to the oil-heater L provided with a closed coil M which may consist of two separate sections. The benzolized oil is preheated to the degree required, and flows into the lower section of the still M^1, meeting a current of direct steam, which distills off the benzol vapors—the mixture carrying the naphthalene removed from the gases, and a certain proportion of the wash-oil. The mixed vapors flow into

the condenser N. This consists of three sections, the upper fitted with vertical tubes, the central with a cooling worm, and the lower forming a receiver and separator for the mixture of crude benzol, etc., and condensed water. The crude benzol flows into the receiver O. The debenzolized oil is cooled in the cooler P and then returned to the tank B, and again put into circulation. The absorptive power of the oil is practically equivalent to that of the fresh oil. A tank R is provided for fresh wash-oil.

Assuming, for the purpose of illustration, a daily output of 100 gallons of crude benzol, and thus an accumulation in a certain period of a quantity suitable for the refining process, the capacity of the benzolized oil-tank is designed to accommodate benzolized oil while the still (converted) is treating the accumulated crude, and gradually to work off the accumulated benzolized oil during the period in which the crude benzol is being stored. The limits of the operation are obviously circumscribed by the tankage, and the capacity of the still; but generally, the process can be utilized on a scale somewhat greater than that illustrated. For larger capacities—up to, say, 50,000 tons of coal annually, a separate rectifying still is recommended.

Refining Process.

The refining process is as follows: A section of the pump K is placed in connection with the crude-benzol tank, and forces crude benzol to the agitator S. The crude oil is treated successively with concentrated sulphuric acid and water; the impure acid and water being discharged through the pipe T, and then with a solution of caustic soda being finally well washed with clean water. Gauged receptacles UV are for the acid and caustic solution.

This treatment proceeds while the debenzolization of the enriched wash-oil is in progress in the plant. A section of the pump K is then placed in communication with the crude-benzol tank O, and crude benzol is pumped to the upper part of the still M^1, which has been adjusted for the rectification of the crude benzol—the still being washed-down by these means. Washed crude benzol is then admitted by gravitation to the converted still, and distillation proceeds with a closed coil.

The vapors pass through certain sections of the column, and flow to the condenser, when the first runnings are rejected and returned to the crude-benzol tank. The refined condensed benzol then is discharged by separate fractions through a check receiver, fitted with a steam ejector for vacuum distillation, into receptacles or drums W, and is then ready for use. If drums are employed, an automatic filling valve regulates the flow.

The distillation of the higher homologues of the benzol series may be assisted by direct steam towards the close of the operation. Upon completion of the rectification the still again is converted for debenzolizing the wash-oil; the residue of wash-oil containing naphthalene being previously discharged into the crystallizing tank X; the naphthalene separating; and the oil being returned to the oil-tank, while the benzolized oil is again put into circulation through the heater and the still.

Generally, the plant is designed to operate with only occasional supervision. This is accomplished by effectively regulating the flow of oil both through the scrubber and through the debenzolizing apparatus, and maintaining a recorded check on the quantity of crude oil produced. Obviously, while the washing of the crude and the refining is proceeding more supervision will be required; but, inasmuch as the quantities of acid and caustic solution for washing are predetermined, and a recorded check on the temperatures maintained (which may be effected at a central point), little expert knowledge will be required when the mixture of the distillates has been settled according to the finally desired products.

Primarily, the object of this plant is to reduce the capital expenditure to a limit which will ensure an adequate return. The production of a standardized pure product *in situ* avoids the loss of wash-oil—and with it certain constituents removed in the washing process—and adds value per gallon to the final product. Probably, without exception, the local demand for motor purposes will ensure the absorption of the output from all plants with little effort in the direction of retailing.

The still performs the two functions of debenzolizing the enriched wash-oil and refining the crude benzol by a simple device which can be immediately adjusted. The heat balance of the plant (in which is included the excess power for the exhauster, the pumps, and the agitator) conforms approximately to the larger units, while it is possible in a small plant of this character to utilize a part of the sensible heat in the hot debenzolized oil. Condensed water from the closed steam-coils is automatically returned to the boilers.

Finally, assuming that the conditions permit, up to 90 per cent. of benzol may be withdrawn from the gases, which may be contrasted with from 10 to 20 per cent. less where the usual standard specification of crude has to be complied with.

"The time has come to conquer or submit."—
"For us there is but one choice. We have made it."
—President Wilson.

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LEGAL DECISIONS

Consent of Utilities Commission To Change Rates.

The receiver of the Kansas Natural Gas Co. and the Olathe Gas Co. have no right to change the rate, schedule of charges, rules, regulations or practice pertaining to the supply of natural gas to the patrons of the Olathe Gas Co. without the consent of the public utilities commission.—State ex rel. Bristow, Supreme Court of Kansas, 165 Pacific, 1111.

Validity of Order of Corporation Commission.

An order of the corporation commission requiring that natural gas be furnished to the board of education of the city of Guthrie for heating the public schools, at a rate different and less from that charged to other consumers, is not, by reason of the discrimination in favor of the public schools alone, invalid.—Guthrie Gas, L. F. & Imp. Co. v. Board of Education, Supreme Court of Oklahoma, 166 Pacific, 128.

Contract Between Gas Company and City.

A gas company, which for several years had the benefit of a contract with the city, was thereafter estopped to question its liability thereon, on the ground that its predecessor made the contract. If a contract between the city and the gas and electric company for service at stipulated rates is valid, it may be enforced by the consumers.—Wackenhut v. Empire Gas & Electric Co., Supreme Court of New York, 166 N. Y. Supp., 31.

Injuries from Gas Explosion Due to Negligence.

It was negligence for a gas company to open an outlet in a gas pipe to allow the gas pressure to blow out the obstructions in the pipe and thereby liberate in a partly closed shed highly combustible or explosive gas when mixed with air, unless this was unavoidably necessary and was accompanied by every reasonable precaution for guarding against the danger thus created. That this was not unavoidably necessary was conclusively shown by the fact that the gas company could have installed, and shortly after the explosion did install, an apparatus of which it knew, and which it had not installed sooner merely to save expenses, and by testimony that a pipe could have been adapted to the outlet for conducting the gas out of the shed to be harmlessly diffused in the open air.—Bradley v. Shreveport Gas, E. L. & P. Co., Supreme Court of Louisiana, 76 Southern, 230.

Gas Pipes and Dedication of Street.

Neither the laying of gas pipes by a public service corporation nor building a private sewer with the city's consent constitutes an acceptance by the city of a street dedication. Closing a thoroughfare, not accepted by the city as a street under Laws 1895, c. 1006, providing that the street in such case ceases to be such for any purpose, etc., extinguishes private easements arising from grant, and an abutting owner is entitled to compensation therefor.—City of New York v. Farrelly, Supreme Court of New York, 166 N. Y. Supp., 428.

Injury to Gas Mains from Sewer Construction.

Where it was possible to construct sewers without injuring gas mains, the gas company could recover from a city contractor damages for the latter's negligence resulting in disturbance of mains, leakage of gas, and fire. A gas company could not recover damages to its mains necessarily resulting from construction of a city sewer, since a municipality does not abdicate its paramount right in a street by giving a franchise therein to a public service corporation, and the gas company's franchise was subordinate to the city's control of the streets.—Portland Gas & Coke Co. v. Giebisch, Supreme Court of Oregon, 165 Pacific, 1004.

State Regulation of Natural Gas Rates.

Natural gas, procured by a company or its receiver in one state, and piped into and sold in another state, the greater part of its cost to the company at the place of sale being the expense of transportation, is an article of "interstate commerce," and does not lose that character because it is mixed in the pipes with a small quantity of gas procured in the state in which it is sold. The company or receiver conducting such business is engaged in interstate commerce, and although the gas is distributed to consumers through local companies, which receive an agreed share of the proceeds, the enforcement by the state in which the sales are made of any law or regulation fixing the price to consumers, which substantially burdens the business or renders it impossible to conduct it at a fair profit, is an undue interference with interstate commerce, in violation of the commerce clause of the federal constitution.—Landon v. Public Utilities Commission of Kansas, U. S. District Court, Kansas, 242 Federal, 658.

Injuries from Gas Explosion Due to Negligence.

The pipe in question was properly laid, and was duly inspected; but when, in the morning of the 5th, several hours before the explosion, the gas company was notified of this strong odor of gas pervading the establishment in question, and was requested to have an immediate investigation made, it should have done so; and its failure in that regard was negligence. Perhaps no very grave negligence; but gas companies are held to a very high degree of care. "It is a well established rule that a higher degree of care and vigilance is required in dealing with a dangerous agency than in the ordinary affairs of life or business, which involve little or no risk of injury to persons or property, and in view of the highly dangerous character of gas and its tendency to escape, a gas company must use a degree of care to prevent the escape of gas from its pipes commensurate to the danger which it is its duty to avoid, and if it fails to exercise this degree of care and injury results therefrom, the company is liable, provided the person suffering the injury either in person or in property is free from contributory negligence."—Feely v. National Packing Co., Supreme Court of Louisiana, 75 Southern, 837.

Issuance of Bonds by a Gas Company.

Although public service commission has no authority to dictate as to how the money in the treasury of a public service corporation shall be disbursed, and if such corporation is actually entitled to issue bonds the commission has no power to affix as a condition some act that it has no jurisdiction to compel, it does have power, in an order granting consent, to impose a condition based upon facts which justify the order with the condition, and has authority to require a gas company to apply to reserve from a bond issue the amount of an expenditure made from its depreciation fund, since to permit the company to issue bonds to reimburse it for expenditure from a depreciation fund would be in effect to permit it to capitalize its depreciation fund and create an obligation of the company to that amount.—Kings County Lighting Co. v. Straus, Supreme Court of New York, 166 N. Y. Supp., 196.

Manufacturers Section To Meet in New York, Oct. 16th.

The annual meeting of the Manufacturers Section of the National Commercial Gas Association for the election of officers for the coming year and such other business as may be brought before it, will be held at the Hotel McAlpin, New York City, October 16th, at 8 P. M. A full attendance is requested.

Pacific Coast Gas Heating

The Systems and Practice Now in Successful Operation There Are Carefully Analyzed by a Leading Heating Engineer at Pacific Gas Meeting

By M. L. Neely

M L. Neely, in his paper before the Pacific Coast Gas Association at Santa Cruz, said:

When our worthy secretary asked me to prepare a paper on gas heating systems, I accepted readily in that I had been especially interested in gas heating systems for the past three years, but thinking it over later I felt a certain embarrassment over the matter, for the field I have covered has been with the Hawks and Rector systems almost exclusively and I feared that that immediate experience might not afford the data for an article as comprehensive as this association would demand. However, my confidence returned when I stopped to realize that I would get a hearty response from any member of this association with whom I should consult on ideas and that facts and figures wanted would be forthcoming from all. In fact, the real value of a paper of this nature is the portion devoted to facts and figures on actual results that have been obtained in actual experience along the coast, and given to you in detailed form so that you can apply and convert those results to your own conditions, e.g., heating values, gas rates, etc., and determine what can be done with similar installations. I have attempted to take in every field for heating installations possible, such as residences, auditoriums, offices, stores, apartment houses, garages.

From the early days of the natural gas fields, people have used gas for heating purposes due to its low cost and high B. t. u. value, but no particular effort was made to design a gas-fired furnace or heating system which would use this fuel economically. It was something of a makeshift matter of equipping the old hot air furnace, hot water or steam boiler, with some sort of burner. It was not until 1911, so far as I can learn, that any effort was made to use artificial gas or a mixed gas for heating except in a temporary medium for quick heat such as a room heater. Then about this time the Rector system gas heating appeared; but, unfortunately, was not perfected mechanically before being placed on the market. The principle was good but agencies other than gas companies made many faulty installations, which for a long time gave the system a distinct setback. The prices on the radiation were excessive, due to royalties and patent rights, and this made it difficult to sell. Fortunately, since that time, the gas companies in many locations have bought out the agencies, are now making the installations themselves, and perfect results are the outcome. This system properly installed and given the proper periodical inspection service, will show perfect results and can better than compete with any other type of fuel on any score.

The Radiator.

The numerous gas-fired steam radiators were also coming on the market at this time, but due chiefly to lack of provision for venting and to their relatively low efficiency, they were a means of convenience for a limited time only.

In 1912 natural gas was being delivered to the southern part of California and sold as straight natural gas or as a mixed gas. Its high B. t. u. value opened a fruitful field to gas heating systems and almost endless types were invented and put on the market—the greater percentage being absolutely inefficient and a menace and annoyance to the gas companies attempting to make installations of proper heating systems which would give satisfactory service to the consumer at a minimum cost. However, there has been developed since that time the Hawks ventilated gas radiator, the Peerless, Stephens & Kane automatically controlled gas-fired steam boilers, "The Gasco" hot air furnace by E. L. Hall, engineer of the Portland Gas & Coke Co., "The Perfection" hot air furnace and the Humphrey "Radiantfire" heater. All of these have given excellent results and seem to meet with the approval of gas men generally as well as the ultimate consumer wherever I have investigated.

Many types of floor furnaces have appeared on the market, but it is the writer's personal opinion, and in fact, checks with the data of most sales departments on this coast, that their field is limited, that they are not as efficient as many other types of heating systems and yield a greater percentage of complaints than other heating sys-

California Apartment House and School Heated by Gas. The Apartment House Has Hawks Radiators, the School Ideal Boilers.

tems that can be sold quite as readily as any one of these furnaces.

The latest arrival on the market is the Humphrey "Radiantfire" heater. This fills a long felt want for the many unused fireplaces both in living rooms and bed rooms—unused because of the nuisance of dust and dirt resulting from burning coal or wood. The old gas log and asbestos back looked good and filled the need to a certain degree, but either was in the main ineffective or the cost of operation was high. Radiant devices have been used in England for a number of years and I am informed that 80 per cent. of the physicians and surgeons in London use and recommend radiant gas heaters. They use them in waiting rooms, consulting rooms and nurseries. They also recommend them for delicate people and especially those suffering from pulmonary complaints. This would seem to be strong evidence of their hygienic value in addition to heat satisfaction.

California Garage and Sales Store Heated by Gas, November to March, $191.

The "Radiantfire."

The Humphrey "Radiantfire" has as near perfect combustion as has ever been obtained. The heater, far from being the ugly utilitarian thing of the past history of gas heating, is a decoration to any home or office and at the same time gives results, for it puts the heat on the floor where it is wanted, and not deflected toward the ceiling where it is lost. To test its worth, the writer installed a No. 102 "Radiantfire" in a fireplace at his home and used it entirely during March to take care of a living room 20x16 ft., and a dining room 14x13 ft. The average minimum temperature for the twenty days of the test was 38°. The heater was used on an average of ten hours a day, maintaining a temperature of 70° in the rooms. The cost per day with gas at a dollar a thousand cubic feet was 31½ cents.

There is a big field for this appliance and there should be little difficulty in placing many of them this winter. In new houses it is not necessary to build the ordinary sized flue, but with a built-in fireplace a small flue will take care of venting. Terra cotta or cement pipe which will fit in a 2x4 ft. partition can be used for this purpose and can be had from Gladding McBean & Co., of San Francisco.

Heating with gas is essentially the gas company's business. "Heat with Gas" should be as familiar to the public as "Cook with Gas." A dealer's interest ceases when the installation is complete and paid for, and at this point is where the most vital interest of the gas company starts. Companies differ in opinion as to whether they should make the installation or leave it to the dealer. If it is left to the dealer, then it is distinctly up to the local company to find those dealers who will follow the directions and rules of the gas company as to installations, so that they and the consumer are protected.

Co-operate With Dealers.

A dealer should always be allowed a reasonable profit, but there is a tendency to go beyond this reasonable profit and thus prevent many installations that otherwise could have been made. The Los Angeles Gas and Electric Corporation do not themselves install heating systems, but they have an admirable new business department which advises the people as to their needs and what system best fits their purpose. This department follows up each installation and sees to it that it is properly installed and adjusted. The result has been that the people have found this agency's advice is good, and depend upon it to see that they are properly equipped. Quoting H. J. Kister, new business manager of the Los Angeles Gas and Electric Corp.: "Like every other gas company, we have experienced considerable trouble through the sale of cheap appliances and faulty installations. This we are doing our best to overcome and continually help the dealers to sell good appliances and insist that our instructions be followed on the installation. Prior to five years ago there was one gas furnace installed to four furnaces using other than gas for fuel, and by consistent work this condition has been reversed until today there are four gas furnaces installed to one furnace using other than gas as fuel."

Every gas company should have a test room where a complete scientific test of any gas heating appliance should be made. If the laboratory test shows high efficiency, then an installation should be made, free of cost or on trial if necessary, to obtain a practical test. Both checks on any system are necessary, for very often an appliance will show high efficiency in a laboratory but later in a real installation, mechanical defects may be found which can be overcome before the system is offered to the public in general as being good.

Care in Approving.

Too often have salesmen and men higher up approved appliances, and often by letter, without a thorough test; and the results have been embarrassing. This forfeits the confidence of the people and you all know that one consumer dissatisfied with a heating system will give you publicity hard to overcome. No letter approving any gas heating system should be written by anyone other than the executive head of that company, and if that is his peculiar field, few letters will be written, and none except on proven facts that the company can back up. To demonstrate the danger a little more clearly, let me cite an instance: A man handling a floor furnace had been trying repeatedly to obtain a letter from the head of a certain new business department. This was refused, since this particular unit would not prove up and also because this manager considered it poor policy to issue such letters. In his absence, however, the floor furnace man took the matter up with another official of the company and a letter was written praising the appliance. It was immediately used as an advertising medium and it was with some difficulty that the gas company had the letter withdrawn.

The Pacific Gas and Electric Co. and the Portland Gas and Coke Co. are installing at this time heating systems themselves and generally, I believe, it is the better system. I tried the dealers first and could arouse no enthusiasm, and finally started in with my own crew. Our first installations were with Rector, and where they proved good, the first year certain imperfections in some types of fans and motors came up, particularly in the pressed steel radiation. Also in one

vo cases in which a plumber had : the installation, imperfect work done. However, our next season 'emedied all these defects at our expense and the systems then :ed perfectly. We thus gained the . will of the consumers using the :ms and their good word has ıt much in other sales. In the Joaquin Valley, with a net gas of $1.10 per thousand, we can heat the Rector system at lower cost es than with any other type fuel. have taken on a large garage and room, a big cathedral, a prominent store where oil was replaced, and y residences, and every single one hese consumers is a booster and dvertising medium for us.

The Pacific Rector System.

to installation of the Pacific Rec- ystem: It is absolutely necessary the exhaust or suction pipe to the ɔr be galvanized pipe, of the proper and properly graded without any ı, so that the condensation may be erly taken care of and be prevent- 'om running into the fan. The ex- t from the fan should be of ade- e size and carried above the roof. as heretofore been a matter of s work to a very great extent, as he proper sized exhaust pipes to various sized radiators, and as a lt it was hard to get the same um on all the radiators. This, how- has been overcome through the : of Wm. Henderson, assistant :ngineer of Pacific service, who has d a chart determined by a Spitz- ı slide rule, wherewith the exact piping can be obtained to get n. vacuum in every radiator. This been checked with actual tests and curate. The motor should always et on a concrete foundation and part of the building where any : from the same will not annoy the pants. If installed with a ther- :at, there is a material saving in gas umption. The heater works most ently at .65 cu. ft. of gas per square of radiation installed. Care must :aken to keep excessive free air of the system, as this only drops efficiency. All doors and flappers, should be properly seated and the ers kept clean. Where any heat- ıystem is installed, someone on the ıises who is to look after the sys- should be properly instructed as to lling it, but always with the dis- idea in mind that when in doubt, the gas company. It is a fatal er- :o permit any one but a thoroughly rienced employe to adjust or regu- a heating system. Regular serv- hould be given gratis on any heat- system, for this not only keeps ıtisfied consumer, but makes him sales agent.

Hawks Radiators.

In our second season we started in on Hawks Radiators, following the pioneer work done by the San Jose district of our company, and installed 1,100 sections that season. We did not have a single section to remove and all were put in on a guarantee to make good or come out. At present Fresno has 3,000 sections of Hawks, and it goes in all advertising mediums for this fall. We have replaced many oil installations.

St. Johns Cathedral, Los Angeles, Heated Five Months, Cost $50.60.

In installing Hawks radiators, the gas supply and vent have much to do with the successful operation of the heater. The additional cost of adequate sized pipes or flues is negligible when their increased carrying power is considered. Run full sized supply pipe to reach the heaters. Five cubic ft. of 600 B. t. u. gas per section is the greatest that should be used on 38 in. radiation and 4½ cu. ft. is more efficient. As to vents, practice has shown that iron or steel pipe scales to such an extent that it is not practical to use. Galvanized pipe is better, but even this in time will scale. The Fuller Paint Co. make an asphaltum varnish to coat the inside of pipes, and they claim it will prevent rusting, but as yet this has not been tested long enough to render a definite opinion, but it may have merit. The best vent for Hawks heaters is a terra cotta or cement tile. Gladding McBean Co. are now making both of proper size for venting and they will readily fit a 2x4 in. partition. The vents should always be clear of the roof and a cap put on. One other important matter is to so place the drip that it will always clear itself.

The time has passed for any one in the gas business to fear the outcome of gas heating. Every new business department should watch the building inspectors department daily, and when a permit is let for any structure, look up the architect, contractor and owner and stay with it until you land the order. Let them all know that the gas company stands back of its heating systems with a guarantee.

Architect Is Best Friend.

The best friend you should have is the architect, for people look to him for advice in everything going into the home. Don't forget that in most instances they call for bids on heating, and do not figure radiation themselves. Just drop in their office at times and see what they have in prospect and tell them what you are doing with gas heating. They may have a prospective plan, and if you can figure right then what they need and approximate cost, it has great weight in their final judgment. I have picked up many a system by this method and now have two architects specifying gas heating systems. Often you will get calls from an architect before any contractor or plumber gets a chance at the job, providing you have gained his confidence by results obtained.

One big field open for gas heating is in apartment houses. It is seldom that any two people require the same amount of heat, and as a result the apartment house owner has constantly

Los Angeles Residence with Peerless Boiler System; Average Cost About $20 per Month.

WHEN a man wants to improve the lighting of his store or office or his factory, what should he do?

You know that there is nothing, gas or electric, to compare in brilliance, economy, effectiveness, dependability and artistic appeal with

The Humphrey

Radio-Series

Lighting Units

But does *he* know it? Have you made the people in your town appreciate it?

There is a big volume of this business to be had, it offers you rich profit from the most desirable class of customers if you will standardize the Radio-Series as the *modern* gas light.

There is nothing better but the sunshine. Prove it to your people now.

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GILBERT

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SYSTEM of AUTOMATIC TEMPERATURE CONTROL

Any system of combustion on any form of industrial apparatus using gas fuel for any temperature from 120°F to 3000°F

High pressure gas that permits of single pipe lines of simple design will supplant the present system of combustion for all industrial processes and just as surely the GILBERT SYSTEM OF AUTOMATIC TEMPERATURE CONTROL will supplant hand control for all forms of industrial apparatus.

However you may state it to your client, you are not telling him the whole truth when you say that you are giving him what is best for his purpose and you have not included the GILBERT SYSTEM of AUTOMATIC TEMPERATURE CONTROL in your estimate.

Get the facts concerning our system of automatic temperature control by submitting to us your definite proposition and permit us to recommend to you a proper outfit for your purpose. We will guarantee what we recommend and the service we render is that which you will appreciate.

Ask those who are using our system of automatic temperature control. You will find them in every city and town throughout the country and you will find that after years of daily service they have not deteriorated and have not required replacement of parts or expensive maintenance.

H. E. GILBERT COMPANY, Inc.

50 CHURCH STREET, NEW YORK CITY

to meet the complaint "too hot" or "too cold," and he would like to obviate this trouble. I have now my second apartment house heated with gas. Each apartment has twenty sections of Hawks radiation, with a separate house line and meter on each apartment, and it might not be out of place to add that each has a 2½ gallon automatic water heater and cabinet range. The results are perfect, for each tenant can be as hot or cold as he likes, as he furnishes his own heat. This complete installation was put in at a cost slightly above the price in the original bid for a flue for a steam installation.

The "Stevens" and "Peerless."

The writer spent three days in Los Angeles and vicinity to see what had been done in gas heating, and thanks to Messrs. Kister, Roberts and Haugh, he covered a great deal of territory and inspected many systems. The Stevens and Peerless automatically controlled gas-fired steam boilers have given excellent results and many fine installations have been made. In certain apartment houses, each apartment is heated with an individual steam boiler, each on its own house line and meter. The system works perfectly and the consumers are satisfied with cost of operation. Any good steam fitter can install the radiation and pipe work, but it is distinctly the gas man's office to watch the gas end of the installation.

As a primary installation for people who want a hot air system, the Perfection gas furnace seems to meet with general approval. Costs of operation are reasonably low and the furnace being equipped with three burners, is easily controlled as to high or low temperatures. I am firmly convinced that where one has a 600 B. t. u. gas with a heating rate of 75 cents per thousand that he can compete with solid fuels with a Perfection furnace.

The finest gas heating system it has ever been my pleasure to inspect is in the Redondo (Cal.) technical high school. It is an indirect system. The installation consists of six No. 38 Peerless gas-fired and automatically controlled boilers. The 10,000 cu. ft. of air per minute going into the Plenum room is washed through water. There are 3,200 ft. of Vento coil in the Plenum room, the equivalent of 16,200 sq. ft. of radiation. Each room in the school is an independent unit and automatically controlled by a damper in the ceiling of the Plenum room. The temperature maintained in the school rooms is 68° and is raised from an average temperature of 52° on the outside. Four pounds steam pressure is carried on the boilers.

From 6:30 a. m. to 8:00 a. m. 5 boilers are used.

From 8:30 a. m. to 12:00 m. 3 boilers are used.

From 1:30 p. m. to 4:00 p. m. 4 boilers are used.

From 6:00 p. m. to 8:15 p. m. 3 boilers are used.

The B. t. u. value of the gas is 1,200 and the rate 75 cents per thousand cu. ft. The bills for five months were as follows:

October	$139.13
November	152.48
December	120.46
January	225.30
February	197.30

or an average of $166.93 per month. This system was put in under strict competition with the oil burner people and the gas figures are under the estimate on oil. It is well worth the trip to Redondo to see this installation.

The Gasco Furnace.

As to the Gasco Furnace, designed by E. L. Hall, general superintendent of the Portland Gas and Coke Co., I will quote from Mr. Hall's correspondence to me:

"In order to satisfy the demand for a heating system without radiators in the rooms, the Type A Gasco system was developed. The heating elements are units of 'Vento' sections placed in the basement, one unit generally for each room. All of the units are assembled into a furnace. The units consist of the necessary number of 'Vento' sections with a Rector burner and burner box. The units connect to the vacuum line and fan, and operate on the principle of the Rector system. The air supply is brought under the units and after passing over the radiation is discharged through hot air ducts to the rooms either by gravity or fan, as the case may be. Each unit is automatically controlled by the register in the room it supplies, so that when register is closed vacuum in the burner is broken and gas supply stopped; when register is opened vacuum is made and gas is supplied. The operation is accomplished by electrical contacts on the register and magnetic valve on burner. Usually the burner is also controlled by thermostat in the room. Accompanying photos show clearly the construction of this furnace.

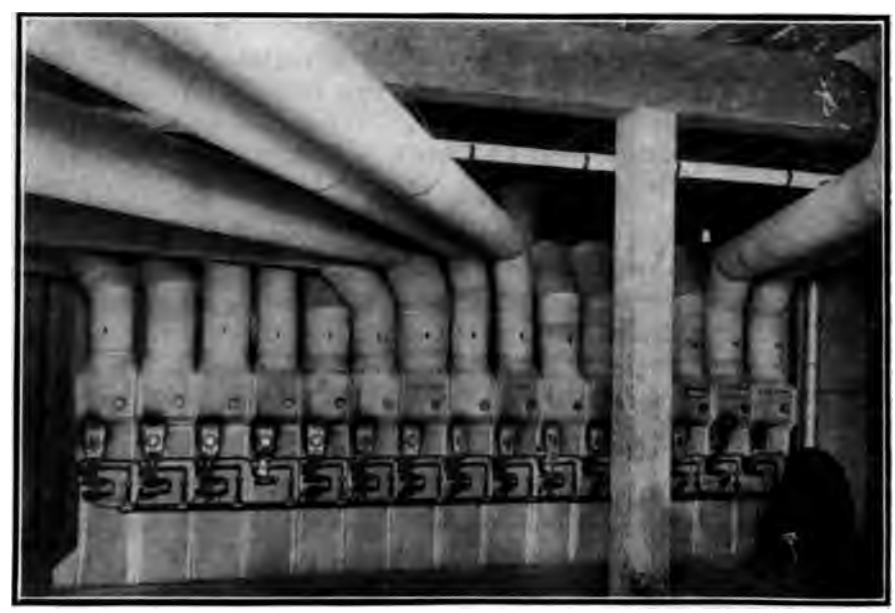
"Type A Gasco system, while representing the highest development in gas heating is an expensive installation on account of the great number of thermostats, magnetic valves, and burners required (one for each unit). The several Type A systems installed in Portland are being successfully operated.

Type "B" Gasco Furnace.

"The Type B Gasco furnace is a successful outgrowth of an attempt to reduce the cost of the Type A Gasco. The Vento sections are massed into one unit and are supplied by two or three large burners, instead of many small ones. One thermostat (generally placed in the main hall, or living room) controls the furnaces through the vacuum fan. Hot air is distributed to the various rooms as in an ordinary furnace.

"Though, as positive temperature control is not obtained as with the Type A Gasco, fairly even temperature is maintained in the different parts of the house, if the hot air ducts are properly laid out. The furnace may be enclosed in either brick or sheet iron asbestos lagged casing. The type B furnace has met with a great deal of favor.

"In order to still further reduce the



Installation of "Gasco—Type A" Heating System on Pacific Coast.

cost of the gas furnace the Gasco Jr. was built. Combustion takes place in a sheet iron burner box in the middle of the furnace. The product of combustion rises to the top of the burner box, passes into the Vento section on each side, and is finally exhausted from the bottom of the sections into a manifold and then into the chimney. Circulation being by gravity, the problem was to have sufficient surface to take up the heat and at the same time have a low resistance to the passage of the gases. This furnace is 90 per cent. efficient. A thermostat placed in the room that is most used controls the gas through a magnetic valve. Distribution of the hot air from the furnace is made in the same manner as in the Type B.

"Sheet No. 2 of the Architects Service Bulletin gives data collected in Portland, Oregon, on the Rector system and the Type A and B Gasco systems. The Gasco Jr. furnace being a recent invention, data covering it is lacking.

"Companies entering the heating field will avoid much grief by having their salesmen backed up with engineering service covering the construction and operation of the various systems."

As To Service.

And now as to service:

Most any gas heater will give out heat units, but selling a consumer a gas heater that will give him the greatest possible number of these units—that is where the gas company's service comes in. Just as it does in maintaining these heaters in first class condition after they have been installed, for unless a gas heating system is properly and regularly inspected, we will not get far.

The object to be accomplished in heating is not to furnish heat for the bodies of the occupants of the room, but to provide conditions under which the body will not lose heat rapidly. The body itself generates all the heat required to maintain itself at a comfortable temperature under favorable conditions, and hence, the more nearly the air approaches the temperature of the body the less loss of heat will occur by conduction. With the heat at 70° Fahrenheit, the body produces heat enough to supply the loss without discomfort, and this is the temperature usually regarded as desirable in residences. The advantages in gas heating consist of absolute cleanliness in the house and atmosphere, a uniform and even temperature, automatic control, heat in any quantity and at any temperature—freedom from the servant problem.

There are three points for emphasis in the matter of heating with gas, whatever the system you choose, namely: convenience, cleanliness and hygiene, and economy.

As To Convenience.

As to convenience: Gaseous fuel is in a class by itself. It is always ready for duty at the touch of a match, or if equipped with a pilot light, even the match is eliminated and control being either automatic or at the most, involving the turning of a stop cock.

Cleanliness and Hygiene: From the standpoint of both personal cleanliness and hygiene, the use of solid fuel is deplored. Dust and ashes are distributed over the house, room furnishings contaminated with dust. The resulting condition is highly inimical to personal comfort, health or cleanliness. The lack of ventilation effects stuffiness and air stagnation in the room. Then, gas is not subject to interruption of supply from weather conditions, transportation, and innumerable conditions governing the supply of solid fuel.

Economy: Gas-fired heating systems are highly efficient, whereas solid-fuel-fired systems are quite the reverse. The price of gas is regulated everywhere by a state commission, whereas solid fuel prices vary constantly with car shortage, manipulation, and otherwise.

Teamwork Urged.

In closing, let me tell you that the one thing in which all the Pacific Coast association companies need team work and co-operation is the heating business—to see that every single system installed is properly installed and is what the consumer should have. Don't forget that your inattention to this may cause some other gas man to lose a valuable piece of business. People are moving or visiting from town to town and from state to state, and let one come into your territory who has been prejudiced by a poorly installed or inefficient gas heating system, and you will not only have your troubles curing him, but he is bound to damage you with the publicity he will spread. It is also very often the case that a consumer has engaged an architect from some other town and this is usually the case in smaller towns. This architect may have had experience with some poorly installed gas heating systems that did not give results and the gas man in the small town either loses the job or is put to a high expense to convince the architect that it was the poor installation and not the system that was at fault.

A good example of this is in a new Overland Sales Agency in Fresno. It was easy to sell them an eight-gallon automatic water heater and other appliances, but it was a physical impossibility to talk gas heating to them on account of the experience they had had in another location with a poorly installed Rector system.

This has happened frequently, and so I ask you all to give the matter of gas heating your first preferred attention and by so doing you will be helping the companies and individuals in the association as a whole as well as affording real service to the public, which you, as companies, were created, and as individuals are pledged to serve.

"Radiantfire" Installed at Pacific Coast Meeting.

At the recent convention and appliance exhibition of the Pacific Coast Gas Association, C. B. Babcock, representing the General Gas Light Co., made a great hit with an exhibit of the new "Radiantfire." The booth was made up to represent a living room in the fireplace of which a "Radiantfire" was burning. To make the fireplace realistic, Mr. Babcock had firebrick hauled in and these were used to the number of 450 to construct the fireplace shown in the accompanying picture.

Exhibit of Babcock at Santa Cruz Convention.

CONSUMERS

Gas Fraternity ATTENTION

AME

Gas-Fire

Water

HOT WATER SERVICE
an essential in every ho
AMERICAN Gas-Fired Automatic W
Heaters are designed and built to mee
demand of your customers for an adequate
cient home hot water supply at really nomina

AMERICAN Water Heaters
First Cost, Gas Consumption
Maintenance To An Irreduc
Minimum!

They mean the last word in simplicity o
struction and operation and the highest p
efficiency in service to the user.

When you add AMERICAN Water Hea
your Gas Appliance Department you wi
your consumers a hot water device that
without a parallel.

We Sell Only to Gas Companies and Plumb
Supply Houses and under no circumstan
do we retail.

AMERICAN WAT
ST. LOU

RE WAITING

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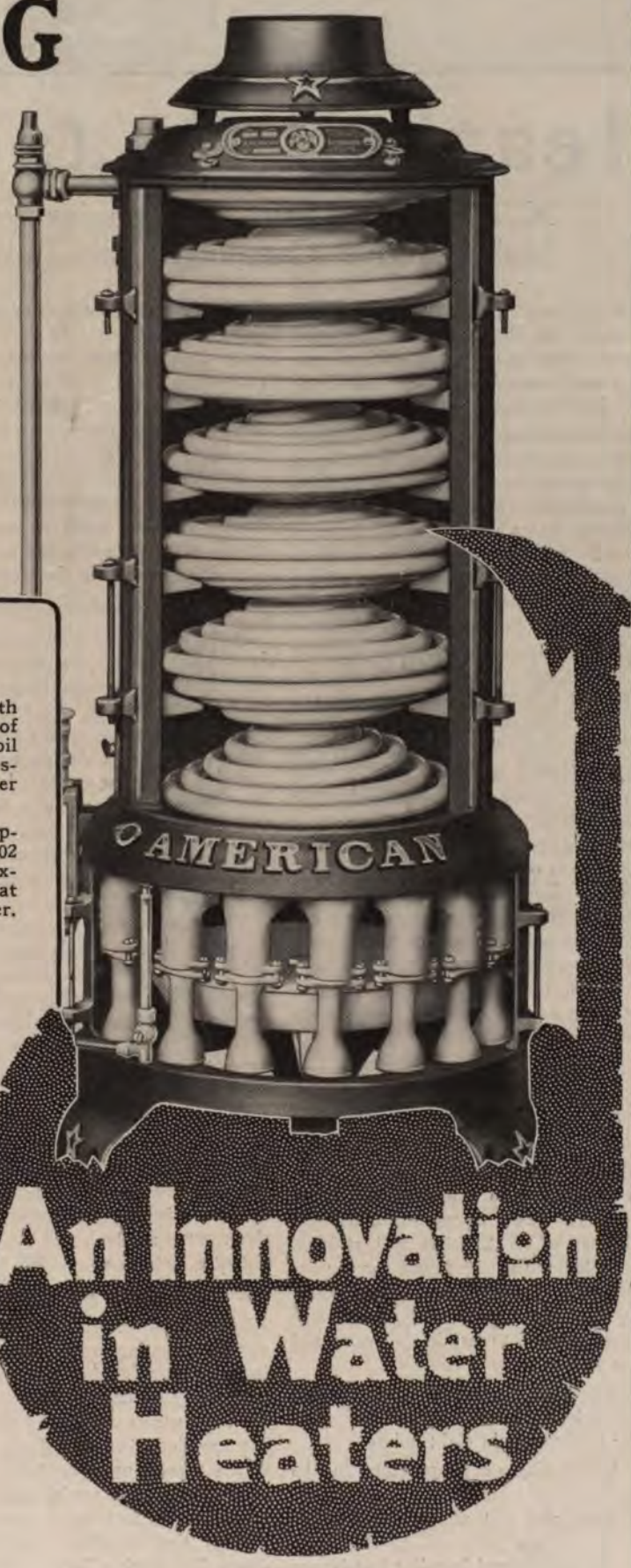


AMERICAN Superiorities:

his illustration of the AMERICAN Water Heater with oors removed exemplifies one of the salient features of mplified construction. Note the accessibility of the coil easily it can be removed. This eliminates the neces- f taking the heater shell apart, as must be done with other s.

he AMERICAN coil is made of eighteen (18) gauge cop- bing—the heaviest used in any water heater—and is 102 length. It is so designed and wound to permit an ex- nal heat travel, with the consequent heat absorption that s the stack loss to a minimum attained in no other heater.

e design and position of the burners in the RICAN Water Heater cause the flame to be ted horizontally, thus providing a perfect e in the combustion chamber, so that each f the coil is equally influenced.

water of condensation can reach or in- the burners, as they are removed from th of the condensate water. And, too, the of condensation is evaporated by the heat the burners almost as quickly as it strikes ip or collecting pan, thus solving one of the st problems of heater construction.

Today for Interesting ls—We are ready for Business!

ATER COMPANY
SOURI.

SELLING GAS

Heating Season

N. C. G. A. Urges Companies to Make Active Campaign This Fall

The National Commercial Gas Association, in the October "Bulletin," urges gas companies to campaign this fall and winter for "house heating with gas" business. The "Bulletin" says:

The association feels that it is doing a worthy service when it calls the house heating season to the attention of local gas companies. House heating, like illumination, has a place in every home in the land. No home is too far south to need quick, extra heat on some of the cold damp days of the year, and no house is so far north but that gas as an auxiliary fuel will materially increase comfort and convenience. Between these two extremes lies a great range of climate and conditions in which many homes will approach the ideal of all-gas house-heating, if only salesmen and gas company work together to install house-heating apparatus of sufficient capacity and efficiency.

Even gas men are apt to think that no new methods of house-heating can be introduced. Because the central coal or coke-fired, steam or hot water plant has been the standard equipment for so many years, householders are naturally a little slow in realizing the possibilities of other fuels. But now is the very time for the gas man to approach this subject.

Fuel Is Convenient.

Gas fuel, delivered at the turn of a cock, day or night, paid for after it is used—a sure supply at a fixed price, this is what the gas man can offer his prospects in addition to a scientifically regulated winter house temperature, without the bother of dust, ashes and stoking. Could a better time be found for the beginning of a "houses heated by gas" campaign than this winter with its probable shortage of coal, uncertain deliveries and higher prices?

Baltimore has made a big drive for two years on house heating by gas and sums up the advantages in eight points.

1. Uniformity of temperature in the house.
2. Dust and dirt reduced to a minimum.
3. Fuel not stored in cellar in advance of season, customer paying for gas as he uses it.
4. Elimination of storage space required for coal.
5. Cleaner cellar, and hence, more extended use for it.
6. Ease of mind on part of tenant concerning firing troubles and lax janitor service.
7. In restricted and exclusive suburbs, the abatement of the smoke nuisance and carting of coal, with the attendant dirt, across well kept paths and lawns.
8. Highly efficient fuel service.

Meets Weather Conditions.

Success in house heating with gas lies in meeting honestly the local weather and fuel conditions on the basis of complete or auxiliary service. In order to do this it is first of all necessary that houses be piped for gas with outlets convenient for portable stoves or fireplace heaters. This fact suggests a plan for a house-heating campaign even better than reductions on prices. Charge full retail prices for portable heaters and make connections either free or at special rates.

The merchandising problem is one, however, that demands careful consideration. One southern company points out that the chief competitor is the oil heater and in this situation a big increase in sales was obtained by making an allowance of from 50 cents to $2.00 on each oil heater returned.

The gas company that starts a house-heating campaign is not breaking new ground. Enough has been done to mark the way and yet so far from the saturation point is the heating field that attractive returns are bound to result from persistent efforts to secure this business.

Cases Are Cited.

The report of the 1916 committee on auxiliary heating enumerates eight installations of gas fuel hot water systems used exclusively to heat as many homes; two hot air systems depending exclusively on gas are described and four installations which depend upon portable heaters. A recent item in a trade paper tells of a novel heating installation in an Ashtabula (Ohio) theatre when the boilers broke down. The Pacific Service Magazine cited the case of the New Masonic Temple of Vallejo, Cal., a four-story building which is completely equipped for gas heating. The New Modjeska theatre of Augusta, Ga., is entirely heated with gas-steam radiators. The Tampa Gas Co. in two years has installed over 4,500 sections of gas-steam radiators.

At New Bedford, Mass., there is a three-story building occupied by retail stores, offices and a store room, all of which are kept at the proper temperatures by gas radiators. This system has been used for several years with the greatest satisfaction to both owners and tenants of the building.

In a word, enough has been done in house heating by gas to stimulate every gas company, according to its local opportunities for all-time or auxiliary heating, to run a campaign which will put a gas heater or a gas heating plant in every home. If you desire further information on installations that have been made and tried out, see the list of articles to be found in the trade journals each month as compiled in "Gas Literature for the Busy Man" under the heading "Heating." This department of the N. C. G. A. Bulletin will give you facts and material for study that will increase your enthusiasm for gas as a house-heating medium.

Make your plans for advertising with newspaper space, gas bill stickers, car cards, wagon signs, handbills or pamphlets. Fill your salesmen with enthusiasm for the idea, give them a good gas heater to sell at a reasonable price and set for yourself the record of doubling last year's sales of gas house heating.

The season is at hand and the business waits only for the energetic work of salesmen and gas company.

Start your campaign now.

Gas Fired Incinerators Useful in Factories.

Gas-fired incinerators are not only useful for destroying refuse from the kitchens in residences, but this apparatus is also being sold in hospitals for destroying bandages and dressings, says "Service," the house organ of the Public Service Corp. of N. J. There are other uses to which an incinerator is put, such as the burning of cancelled checks and documents in banks and accounting institutions, and destroying other useless material in various manufacturing establishments.

Recently a No. 2 Ricketts incinerator was installed in the factory of John W. Beardsley in Newark, who packs shredded codfish, dried beef, bacon and similar food products for the retail trade. This packing house is kept in the most sanitary condition, and the Ricketts incinerator is used for destroying refuse which accumulates in the various departments.

Gas for Emergency Lighting

Its Reliability Is Only One of Many Reasons Why Every Building Should Have Duplicate Facilities for Illumination—A Hospital Experience

The well known fact that gas is the most reliable form of lighting ever devised seems to make it especially appropriate for use as an emergency or duplicate lighting system. The danger of the system usually relied upon becoming defective at any time emphasizes the importance of being able to turn to gas.

Every large building, every public edifice, every hotel, every hospital, every office building, should have gas lighting for emergencies. Then, if the ordinary service is interrupted, gas can be turned to with assurance that it will supply light as long as needed. Most dwellings, even those of recent construction, contain a number of openings for gas lighting, because of the fact that the service is installed for heating and cooking purposes, and the owner realizes that it is a good thing to have facilities for lighting with gas in case of need.

That gas is needed in emergencies is indicated by a recent news item from Louisville, Ky., headed, "Under Knife as Lights Go Out; Has Close Call." The story, which is thrilling enough to be worthy of a place in melodrama, tells of the heroic methods resorted to to save the life of a hospital patient on an operating table:

"The sudden extinguishing of the electric lights all over the city at 9 o'clock last night almost cost the life of J. Ackerly, 19 years old, who was on the operating table at Sts. Mary and Elizabeth's Hospital, where he was hurriedly taken after being seriously injured in an automobile accident. The prompt efforts of Dr. E. C. Underwood probably prevented the young man from bleeding to death.

"Dr. Underwood and other surgeons had just severed a large vein, and stood ready to seize the two ends with nippers when suddenly there was darkness. Blood spurted from the wound, and the physicians were unable to locate the vein in the darkness. Seizing a piece of hot gauze, Dr. Underwood, in the darkness, covered the spot where the incision had been made, while nurses and internes ran about the place frantically searching for kerosene lamps.

"Five minutes later, when lights had been secured, it was found that Dr. Underwood had been correct in his calculations, and had covered both ends of the severed vein. Ackerly, who was already in a serious condition, lost but a small amount of blood."

A Life in Jeopardy.

In other words, the unreliability of the system of lighting used in the operating room, coupled with lack of a reserve or emergency system, put the life of the patient in jeopardy, and it was only because the surgeon in charge of the case was able to guess right that the loss of blood which ensued was not fatal.

That the matter is one worthy of attention is indicated by the fact that publications in the hospital field took note of the occurrence. Hospital Management, published in Chicago, commented editorially as follows:

"Duplication of lighting service is suggested by a recent accident at Sts. Mary and Elizabeth's Hospital, in Louisville, when the lights in the operating room and elsewhere were extinguished with a patient on the table. Only the presence of mind of the operator prevented him from bleeding to death."

It might be contended that most operations in hospitals are performed in daylight hours; also that it is seldom that the surgeon is compelled to meet the situation caused by the extinguishing of the lights. But the fact remains that the operating rooms are often used after dark, and that in the case recorded the accident happened and imperiled the life of the patient in the care of the hospital. It would seem, therefore, that since this danger has been brought home, the value of having other forms of lighting service instantly and continuously available would be made evident.

Another Case Cited.

Not long ago a big hotel in a Southern city, which operated its own lighting plant at that time, suffered an accident in the generating department that resulted in every light in the building going out. The only flame visible for some time after that was the gas jet at the cigar counter, used by customers in lighting their cigars and cigarettes! After some time candles were obtained, and a few lights set up at important points about the lobby. But the inconvenience, danger and loss of business due to this accident were easy to realize, and the hotel proprietors acknowledged it. Experiences of this kind drive home the fact that depending on one kind of lighting service only is a dangerous proposition.

Only recently a big section on the North Side of Chicago was without electric lighting service from early in the evening until several hours later. Householders were fortunate, in most cases, in that at least a few rooms were supplied with gas jets, and these were put to use, enabling the usual occupations of the home to be carried on without delay. Stores, which were doing their biggest business of the day at that time, were practically forced to discontinue business, and for the rest of the evening candles were about the only form of lighting available in that section. These business men saw that the plan of having but one system was likely at any time to result in interrupted business because of interrupted service.

Several thousand employes of a big railroad in a Southern city, at work in its general offices, were recently compelled to discontinue work because of a heavy rain-storm late in the afternoon. The rainfall was so great that water flowed into the power plant in the basement, the fires under the boilers being extinguished, and the lights going out as a consequence. As it was so late in the afternoon that artificial illumination was necessary, everybody had to quit work. The cost of the loss of their services to the railroad was several thousand dollars, enough to have paid for gas lighting service for a long time.

When Lights Go Out.

The inconvenience of lack of lighting facilities, due to accidents or emergencies, has been emphasized. The danger has been pointed to, in the case of the patient in the operating-room. There is likewise serious danger in the case of lights going out in a hotel or other public place, which on this account remains in darkness for some time. The opportunity for pickpockets and other criminals is hardly likely to be overlooked by them, making the situation one not only fraught with discomfort, but with positive danger.

All of this could be obviated by the provision of duplicate lighting service in every building of importance. Enough gas pipe could be installed to take care of the major requirements, in the event that anything happened to the regular system. And it would be certain that the consumption would be sufficient to make it well worth the while of the gas company, which might even make a nominal

service charge for providing its facilities for use under these conditions.

Another thing which would make it certain that gas would be turned to frequently is that the volume of light can be controlled. In the sick-room or in any place where the maximum volume of light is not always needed, a gas lamp is a much more desirable and convenient form of illumination than anything else. Its possible variations are so great that there is no comparison between its desirability and that of electric lamps whose volume of light is adjustable. In the case of the latter the number of adjustments is limited. Besides, special lamps have to be purchased to secure this result. Gas can be instantly controlled, under all conditions, and hence the needs of the situation can be met at any time.

Cost Not Prohibitive.

The cost of providing for duplicate lighting service by means of a gas system would not be prohibitive. It would add something to the expense of erecting a large building, but compared with the total cost it would be a very small item. And it would mean that the value of the structure would be increased in direct proportion, inasmuch as those occupying it would appreciate the advantages of having a duplicate lighting service.

In the case of hotels and hospitals, which have been mentioned in particular, it is necessary to provide gas service for the ranges and for special departments. That would make it a simple matter to extend the pipes over the building, and to provide openings where lighting service might be needed. The increasing use of gas around hospitals, for the operation of ward incinerators, etc., which are coming into greater use, points in the direction of an extension of lighting facilities which would be easy to make, and which would make the hospital safe against any such complications as those which happened at the Louisville institution.

Hotels and hospitals are alike in other respects, in that they are compelled to furnish service twenty-four hours a day, 365 days in the year. Broken service is not a matter to be submitted to with equanimity, but continuous service is demanded, because of the danger of lack of lighting facilities at any time. For these reasons it would seem that these two classes of buildings especially should be addressed with reference to the duplication of their lighting facilities, as they undoubtedly would appreciate the logic of the proposition as it affects their operations.

Kewanee Window Helps Sell 25 Automatics.

The window trim in this page was a feature of the Ruud water heater campaign recently conducted by the Consolidated Light & Power Co., of Kewanee, Ill., in which twenty-five automatic heaters were sold. Harold Fink, the commercial manager, says, in describing the window:

"We made a bath room out of our window, and had a small colored boy in bathing for the entire week, and it surely did attract quite a bit of attention here in Kewanee. It was largely responsible for our selling the twenty-five automatic water heaters during the week."

GAS IN HAWAII.

Honolulu Gas Co. Has Achieved Great Success—Hilo Just Starting.

A. P. Taylor, correspondent for the U. S. Bureau of Foreign and Domestic Commerce at Honolulu, writes as follows in the Daily Commerce Reports of September 20: The use of gas as an illuminant and for kitchen purposes has been a steadily increasing economic factor in Honolulu for the past ten years, and it is about to be introduced for similar purposes in the town of Hilo on the island of Hawaii. The Honolulu Gas Co. had difficulty at first, and in the pioneer period succeeded only in introducing gas mains and illuminating service in the business section. Gas gradually displaced wood and coal for kitchen purposes in restaurants, but the process was slow, particularly among the Orientals. Gradually the mains were extended into the residential section, and for a while there was a substantial use of gas as an illuminant during a period when the charge for electric current was considerably higher than at present. Opposition to substituting gas for wood and coal in kitchen stoves was prevalent, particularly among the Chinese cooks, but the company employed a Chinese cook to make the rounds of the residence section and discuss the advantages of gas for cooking, and finally succeeded in removing the objections. Householders themselves had been willing personally to make the change, but gave the final decision in the matter to their cooks. At last the system was extended into the suburbs, and now there is not a section in the city or distant suburbs that is not served by the Honolulu Gas. Co. The illuminant is made of fuel oil imported from California. The Hilo Gas Co. will commence active operations with its plant about the end of September, 1917. Early in August the Hilo company received 20,000 fire bricks, one carload of gas ranges, three miles of piping, and a large consignment of gas meters, as merely a portion of the initial equipment with which to begin operations.

N. C. G. A. Prepares Article for Sweet's Catalogue.

The National Commercial Gas Association has recently issued in pamphlet form section of Sweet's Catalogue for architects, prepared by the association for the catalogue and dealing with the installation of gas service in residences and other buildings. It is a complete guide for architects on every phase of gas installation, and in addition to ordinary facts and figures the article informs the reader that each gas company maintains specialists who will be glad to co-operate with the architect on any problem he may encounter in considering gas service for his clients.

In order to care for its expanding business, The Macleod Co. of Cincinnati, O., makers of welding equipment now is enlarging its plant and has increased its capital to $100,000.

Kewanee, Ill., Window During a "Ruud" Campaign.

CONVERTING MRS. JONES.

Experience of Public Service (N. J.) Salesman with Customer.

F. Breslow, of North Hudson, N. J., tells the following actual experience:

The very way she opened the door told me that here was a customer difficult to convince.

"Good morning, Mrs. Jones; I represent the gas company and I've called to see whether your gas appliances are giving you proper service."

"No," this in a snappy voice; "my gas bills are entirely too large; I believe the meter is running overtime."

"That might be," I replied. "Would you mind if I looked over your appliances? Perhaps I can suggest some way of economizing."

The first thing I saw upon entering, were three old-fashioned sad irons standing on the gas range, over the giant burner. Here was my chance to sell a gas iron.

"I see you are still ironing the old-fashioned way. Here is a way to economize on both labor and gas. We have a gas iron that will do your ironing for one-tenth of what it costs you now."

"I don't want to buy a gas iron because I think the gas company sells those things to make us use a lot of gas."

"Not at all, Mrs. Jones. On the contrary, our aim is to give you your money's worth. This iron will actually burn ten hours for three cents while you are at present consuming gas at the rate of three cents for one hour. If you will allow me to demonstrate this iron, I will show you on your meter how much the gas iron will consume and how much your burner consumes in a given time."

"I do not believe the gas company sells an appliance as economical as you say. I am willing to be shown."

I made an appointment for the following day to demonstrate the iron. The next day I connected the gas iron and showed her by using the two foot dial how little gas was consumed by the iron in comparison with what was used by the giant burner, in the same time. I sold her the iron. She was pleased and this led to other sales such as water heater, several welsbach lamps, and a cabinet range. She was convinced that the gas company did sell appliances that save gas.

Public Service Gains in Industrial Fuel Sales.

The Hudson Division of the Public Service Corp. of New Jersey showed a gain of $4,804.92, or 21.2 per cent. in industrial fuel appliance sales for the first eight months of 1917 over the same period of 1916. Also a gain of $39,246.95, or 18.7 per cent., in installations for the first eight months of 1917 over the same period of 1916. The same division showed an increase of 148,967,377 cu. ft., or 6.7 per cent., in gas sales for the first eight months of 1917; an increase of 351 ranges and an increase of 42 per cent. on sales of cabinet ranges with a total percentage of 62 per cent. cabinets of all ranges sold.

Humphrey Awards

Consumers' Gas Co., Reading, Pa., brought home the bacon in the Humphrey water heater window competition, just finished. The first award for window displays during Humphrey week went to the Reading organization for the kitchen and bathroom windows shown here. Louis Ragan, of Rome, N. Y., got second money for the window reproduced in the Sept. 26th issue of THE GAS RECORD. Third in the race was the Traverse City (Mich.) Gas Co., with a window featuring the mysterious stream of hot water running from a mirror in the center of the display. Local newspapers said that "several thousand people have stopped to admire and study the window and have given up the problem. Incidentally, they stopped to admire the heater."

Splendid window trims that won honorable mention were entered by the Monroe (Mich.) Gas Light & Fuel Co.; Madison (Ind.) Light & Fuel Co.; Interstate Public Service Co. of Seymour, Ind.; Mitchell (S. D.) Power Co.; Warsaw (Ind.) Gas Co.; Quincy (Ill.) Gas, Electric & Heating Co., and the Public Service Co. of Northern Illinois at Pontiac.

Many excellent windows were entered and the task of making the awards was most difficult. The windows showed an attention to human interest and an appeal for sales that indicates marked ability among gas company window trimmers. Numerous cases were reported where sales were the direct result of the window displays.

Prize Winning "Humphrey" Windows of Consumers Gas Co., Reading.

CURRENT ADVERTISING REVIEW

Seven distinctive newspaper adplates were sent out by the Welsbach Co. for the use of gas companies during lighting week. These plates were furnished free of charge upon request from the gas companies, and a large proof sheet showing all the plates were sent in advance to new business managers, together with a letter from the Welsbach Co. advertising manager, requesting that the plates be ordered entirely at the expense of the company. Through these ads the gas company which has no advertising department is enabled to advertise its lighting week with ads prepared by one of the foremost advertising artists of the land, working with high salaried advertising writers of long experience.

Water Heater Ad. in Chicago.

The gas water heater is the subject of a great deal of current gas advertising. We have selected for reproduction here a striking piece of it, from the advertising department of the Peoples Gas Light & Coke Co., Chicago, which company, by the way, seems to realize the importance of publicity probably to a greater extent than any other company in the country, so far as our information goes. At any rate, the Chicago newspapers seldom appear without a strong appeal to the public to partake of the advantages of gas service in some form. The particular advertisement reproduced here is from the company's house organ, "Advance Club News," although the illustration, with different text, was the subject of a big display in the Chicago dailies recently. Why the text is changed in the company's publication we do not know, unless there were two interpretations of the artist's design and the advertising manager decided to let both see the light of day. In our opinion, the difference between the two bits of copy is the difference between tweedle-dum and tweedle-dee; both advertisements will sell water heaters.

One of Welsbach Series.

THE rays from a Gas Room Heater are pleasant and comforting.

The mere touch of a match brings a cheerful glow, and banishes the chill from the coldest room.

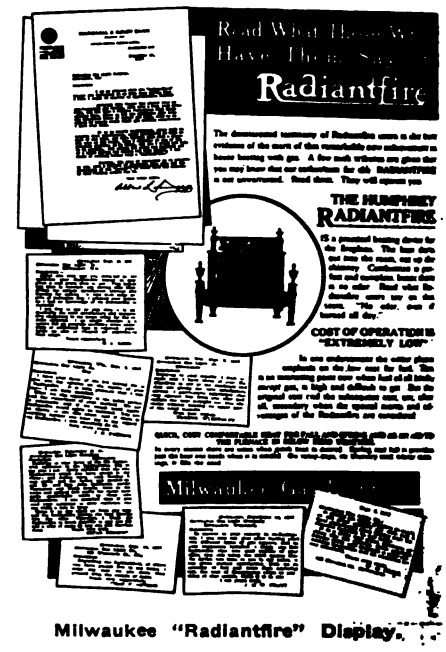
Ask for our prices now.

(Your Name and Address)

G-881

Another McJunkin Hit.

The line of McJunkin (Chicago) advertising arranged for fall and winter use in local newspapers by gas companies touches upon practically all appliances, especially attractive among the lot being the house heating displays. We have selected one picturing the advantages of the portable room heater. This one, explains the McJunkin management, is designed for envelope stuffers and gas bill stickers, but at the same time it can be used in one-column display advertisements.



Milwaukee "Radiantfire" Display.

The Milwaukee Gas Light Co. has recently advertised the Humphrey "Radiantfire" in a big display in local newspapers, a sample of which publicity we exhibit herewith to show how a number of testimonial letters may be incorporated in a piece of informing advertising, without affecting the value of either feature of the display.

A "PREMIX" RESCUE.

T. W. Warner Co. Employes Boil Their Soup with 'em When Steam Fails.

The purposes for which thirty Maxon "Premix" industrial gas burners are used in the Muncie (Ind.) plant of the T. W. Warner Co., of international reputation, are rod end heating, case hardening, annealing, treating lead and cyanide, hardening gears, crank shafts, steering knuckles, various auto parts, and boiling turtle soup.

This last named purpose only developed lately. On Sept. 29th five hundred employes of the plant held their monthly "get together" meeting of the Workmen's Welfare Club. At these meetings it is customary to "throw a feed" which compares in substantiality very favorably with the high grade autoparts on which the Warner company made its reputation, and upon the occasion referred to above one of the most conspicuous items on the menu was turtle soup, of which some two hundred gallons were ruthlessly destroyed.

The commissary committee had arranged to boil this soup in the heat treating room by means of steam from an upright tubular 25 h.p. boiler, but when this process of heat application was applied it was found that the boiler did not possess the necessary excess "pep" in addition to its regular duties. Then up spoke the department superintendent, Ed Noble, as befitted his surname, to this effect: "Boys, let us recall the historic statement of Commodore Perry, when he said 'Don't give up the soup!' We have here in our heat treating department the most efficient fuel burning appliances that the engineering world has ever devised. If the Maxon Premix burner can solve our industrial problems, why in the name of Jennings B. Ryan can't it help us out in this culinary emergency?"

Thereupon the soup was placed in iron kettles upon the lead hardening furnaces and the Premix burners had it ready for instant delivery, thereby proving its capability of handling low heats just as readily as high speed steel temperatures.

Installation of Thirty "Premix" Burners at Warner Plant, Muncie, Ind.

Magazine Tells Story of Doherty's Success.

The most complete story of the life of Henry L. Doherty has just been published. It is in the "American" magazine for October, and it tells of Mr. Doherty's ideas and ideals in a more detailed manner than anything which has heretofore been printed about the head of the Doherty organization. The article, illustrated by a full-page rotogravure portrait of Mr. Doherty, was written by H. Thompson Rich.

National Stove Co. Div. Holds Salesmen Meeting.

The National Stove Co. Division held its semi-annual convention for salesmen the week of October 1st at Lorain, O. Meetings were held in the convention room of the new factory annex just completed. Salesmen attending were Messrs. Kirby, Little, Moore, Linabury, Enos, Hobson, Finch, Wendell and Riemer. Sales Manager Avery for the National Division presided at the meetings.

Hobart, Ind., May Get a Gas Plant Soon.

John Cavender, Adlai T. Ewing, Frank D. Barnes and a Gary-Hobart realty operator, have advertised the terms of the gas franchise they seek from the town board. These capitalists propose to give Hobart gas at a rate of not more than $1.10 a thousand cubic feet.

Miss Corene Cowdery, daughter of Edward G. Cowdery, president of the Peoples Gas Light & Coke Co., of Chicago, was married October 4th to Frank Van Vleet Tompkins. They will be at home after December 1st at 63 Washington Square, South, New York City.

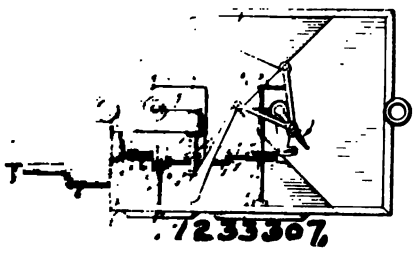
RECENT PATENTS

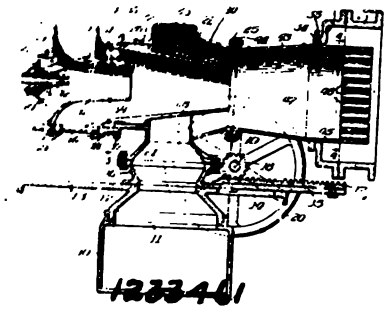
By R. S. McBride, U. S. Bureau of Standards

Patents Granted July 17, 1917.

[illegible] GAS METER. [illegible] Landsdowne, Pa., [illegible] Helme and John [illegible] of Helme & [illegible]

[illegible] CONTROL [illegible] Appleton, and [illegible] Point, Wis. [illegible] Heinrich J. [illegible] by mesne as- [illegible] Chicago. "In [illegible] combination of a gas [illegible] inlet tube having [illegible] gas inlet pas- [illegible] carried by said





[illegible] inlet tube for introducing fluid under pressure into said tube, said injector means being provided with a nozzle adapted to direct said fluid in a diverging path to substantially fill the cross-sectional area of the inner end of said inlet tube."

1,233,558.* GASEOUS FUEL MIXER. Joseph T. Curtis, Milford, Va., assignor of one-half to Henry E. Johnson, Jr., Milford, Va., and one-half to Rosa S. Minge, Richmond, Va. "A gaseous fuel mixer of the character described consisting of a hollow cone having a plurality of encircling rows of slots therein, and an outwardly turned lip at one edge of each of the slots, the lips being arranged on opposite sides of the slots in alternate rows for directing the gaseous currents passing through said slots in opposite directions around the cone."

1,233,606. PEAT GASIFICATION. Thomas Rigby, Dumfries, Scotland, assignor to Wetcarbonizing Limited, London, England. Method of forming a peat fuel mixture for gas producers consisting in feeding forward a stream of relatively moist peat fragments, feeding forward a second stream of such substance in a relatively dry condition and adjusting the relative proportions of said two streams so as to produce when combined a feed of a desired uniform water content.

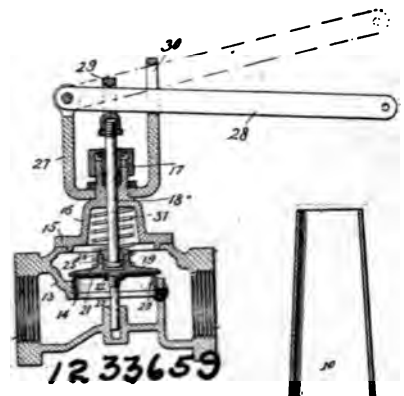
1,233,659.* GAS SHUT OFF VALVE. Otto Fox, Lakewood, Ohio, assignor to the Bryant Heater & Manufacturing Co., Cleveland.

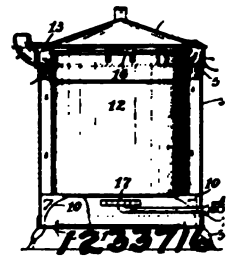
1,233,702.* COMBINED GAS BURNER AND LIGHTER. George E. Pickup, Newark, Ohio, assignor to the Wehrle Co., of Newark, Ohio. "A device of the character described having, in combination, a burner, a unitary pilot-and-flashlight, and valve means having an inlet and having outlets communicating with both said burner and said pilot-and-flashlight, said valve means having a passage which allows the flow of gas to the pilot-and-flashlight when the valve is closed and having a movable valve member arranged to place said inlet in communication with said pilot and flashlight outlet when rotated through an octant and with said burner outlet when rotated through an additional octant."

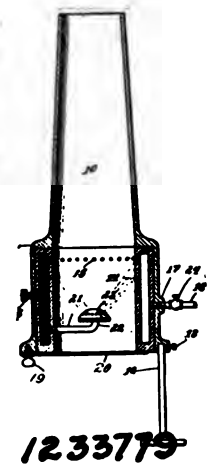
1,233,716.* COMBINATION VENTILATED LAUNDRY STOVE AND BOILER. Abraham Shapiro, Minneapolis, Minn.

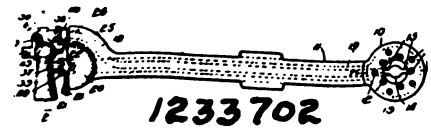
1,233,779.* GAS BURNER. John Hicks, Calgary, Alberta, Canada.

1,234,018. SAFETY GAS BURNER. Sverre Benjamin Hansen, Bayonne, N. J., and









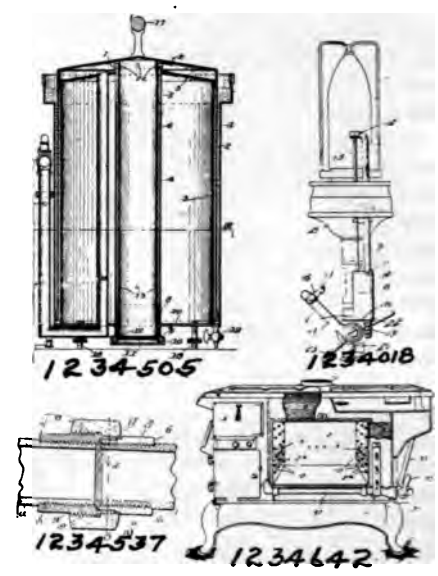
Nils Kristian Enoch Nilssen, Port Richmond, N. Y. An automatic cut-off device for gas burners.

1,234,088. COMBINED OIL AND GAS BURNER. Isaac J. Ralston, Brookville, Pa., assignor of one-half to Charles L. Nelson, Brookville, Pa. "The burner comprises a shell tapered at its outlet end, means for admitting air thereto, a pipe concentric with said shell, a cap whose skirt surrounds the front end of said pipe and restricts the size of the air space within the shell at this point, said cap having obliquely disposed outlet openings forward of its skirt, means for supplying one fluid fuel to said pipe, a second pipe extending along the axis of the first-named pipe and through its cap and beyond the same, and means for supplying a second fluid to the second pipe."

Patents Granted July 24, 1917.

1,234,272. GAS HEATING STOVE. Claud A. Booher, Little Rock, Ark.

1,234,461. GAS WATER HEATER. John F. Goodwin, Sarnia, Ontario, Canada, assignor to Harold R. Goodwin, Sarnia, Canada. A plurality of disc shaped water



sections alternating with the annular water sections and spaced from the casing whereby all the products of combustion flow through the annular sections and around the disc shaped sections, thus passing all over the heating surface, each of the annular and disc shaped water sections being provided with an annular waterway and a cross partition dividing the waterway; and water connections alternately located at opposite sides of said partitions so that the water flows through each waterway from end to end and through all the water sections seriatim.

1,234,505.* GAS VOLUME STANDARD FOR TESTING VOLUME-MEASURING APPARATUS FOR GAS. Marcus H. Stillman, Washington, D. C. (Dedicated to the public.)

1,234,517. FURNACE SETTING FOR THE DESTRUCTIVE DISTILLATION OF COAL OR OTHER CARBONACEOUS SUBSTANCES. Stephen Newcombe Wellington, London, England, assignor to Coalite, Ltd., London, England.

1,234,537.* PIPE COUPLING. John N. Goodall, Melrose Highlands, Mass.

1,234,642.* COMBINATION COAL AND GAS RANGE. Henry C. Dietrich, Evansville, Ind., assignor to Crescent Stove Works, Evansville, Ind.

OPINIONS *AND* COMMENTS

HEAT THE HOMES.

If the industry were fully awake to the opportunity now presented in the critical coal situation, there would be big advertisements running every day in all the newspapers in this country to inform the public of the advantages and the availability of gas for house heating service.

Will some one kindly tell us why there is very little activity on the part of gas companies in this respect? We have been watching the daily papers regularly of late, expecting to see at least the larger and more active companies blossom forth with adequate publicity on gas for house heating. None has appeared, and from this angle nothing like it looms on the horizon. Why? Why?

Is there a manager or a commercial manager in the country who does not know that there is a coal shortage over the entire country, and that people in practically every community are growing more apprehensive each day as the chilling blasts of winter draw nearer and nearer?

Is there one in authority among the gas company officials who does not know that the critical situation may be relieved, and at the same time additional new business secured, with publicity in the newspapers to inform the consumer about gas for house heating?

Only two elements in the industry exist at the present time, so far as we know, to prevent the immediate and energetic exploitation of gas for this worthy service. One of these elements consists of a shortage of gas in the natural gas belts. The other is a very small percentage of gas companies that are at present loaded up to capacity of the plant with other classes of consumers. Adequate and efficient appliances fairly abound throughout the industry, from the portable room heater of many types up to the big gas radiator and furnace systems—all tried out and proved efficient. The average price of gas over the country is low enough to compete with coal and other fuels at the present time, particularly when the cleanliness and convenience of gas service is considered.

For the information of the timid ones in the industry who hesitate to take the plunge into this great new field, we quote from a letter recently received from a leading commercial authority on gas service on the Pacific Coast. He says:

"During these times when fuel, such as coal, oil, etc., are so high priced and scarce, it seems to me that the gas industry generally is not laying as much stress upon the availability and economy of gas for fuel purposes as they should. I have before me a letter from 'The Nation's Business,' published by the Chamber of Commerce of the United States, Washington, D. C. The letter is dated Sept. 20th, stating there are today fifty strikes in the important coal fields, and that under normal methods of operation the railroads have not enough cars to haul the coal that will be needed and at the same time all other freight. This magazine states further that they have a qualified inspector making thorough analysis of the whole situation, and they propose to publish it at an early issue.

"I think all gas companies should make intelligent campaigns to convey to the consumer the advisability, particularly in these times, of using gas. Every thousand cubic feet of gas purchased is assisting the nation to that extent in successfully carrying on the war, not to mention the real advantage to consumers themselves—the cheapest fuel there is on the market."

In England the government itself has recently urged upon the people the "paramount importance" of using gas in preference to any other means of obtaining light, heat and power. In commenting on this action of the government, a British gas journal says editorially:

"Nothing but imperative need would have authorized a change in the coal controller's appeal to the industry to economize coal by utilizing blue-water gas, or would have found the controller actively participating with the ministry of munitions in a change which is directly opposed to what he had himself been working for. The ministry knows very well it is no use working coal-gas plant to its fullest possible capacity without there is a demand for gas; and we are now passing through the period of minimum gas consumption. Hence the notice by the minister of munitions at the beginning of last week impressing upon the public, in view of the 'paramount importance' of meeting the increasing need for by-products obtained from the carbonization of coal at gas works, the desirability of using gas in preference to any other means of obtaining light, heat and power. The recommendation will not be liked in certain quarters where the coal used does not yield by-products; but circumstances will not brook any disapproval. What a blessing the crazy notions of certain people in the electricity supply industry were not realized a few years ago, and that the gas industry did not become extinct before the war started."

Are the gas companies of this country waiting for the Coal Committee at Washington to make similar declarations in regard to

The GAS RECORD

MONADNOCK BLOCK, CHICAGO, U. S. A.

W. H. Graffis . . . . . *President*
H. D. Fargo . . . . . *Vice-President*
H. B. McMeal . . . . . *Secretary*
Herbert Graffis . *Treas. and Adv. Manager*
Milt Saul . . . . *Vice-Pres. and Editor*
Walter V. Turner . . . *Technical Editor*

SUBSCRIPTIONS

The subscription price of THE GAS RECORD is $2 a year in the United States, Cuba and Mexico; in Canada it is $3; in all other countries, $4; single copies, U. S. A., 25 cents.

ADVERTISING

THE GAS RECORD is issued the 2nd and 4th Wednesdays of each month. Copy can be accepted as late as the Monday previous to each issue. Where proof must be seen, allow ample time for transmission in the mails.

	Yearly Rate 24 Issues	6 mos. Rate 12 Issues	3 mos. Rate 6 Issues	Less than 6 Issues
Full Page, per issue . . . . :	$40.00	$46.50	$50.00	$54.00
Half Page, per issue	22.00	25.00	27.00	29.00
Fourth Page, per issue . . .	12.00	14.50	16.00	18.00
Eighth Page, per issue . . .	7.00	8.00	9.00	10.00
Sixteenth Page, per issue .	4.00	4.50	5.00	6.00

Classified Advertising — "Wants," "For Sales," etc.—5 cents a word per insertion, minimum charge $1.

Entered as second-class matter at the post office at Chicago, Illinois, under the act of March 3, 1879.

Vol. 12 No. 7 CHICAGO October 10 1917

the situation in the United States? Let us hope it does not require governmental action to point out the way of duty of good business practice before our companies can see the pathway.

If any doubt the soundness of the business policy in this matter, let him read in this issue of this journal the urgent call of the National Commercial Gas Association for action along these lines.

It is high time action is started. Publicity will start it. A little time and thought, coupled with a few good iron dollars as an investment, not a dead expense, will start the publicity. Call in the newspaper's advertising representative and shoot! Shoot now—

"The bird of time has but a little way to flutter,
"And the bird is on the wing."

FOOD PLEDGE WEEK.

Most of the big things in our connection with the war have been accomplished by the typically American device of devoting a special week to a particular thing and making a national drive upon it. We have had Liberty Loan Week, Red Cross Week, and Volunteer Week.

And, now, Food Pledge Week, beginning October 21st, as fixed by the U. S. Food Administration.

For seven days the press and every possible organization in the country will be directed to the single end of getting the signatures of every man, woman, and child in the United States at the bottom of the food pledge. Everybody in the country has heard something about food saving and understands that it is one of the four biggest services necessary to win the war. Everybody is more or less kindly disposed toward food saving—and hopes that the other fellow is carrying out the provisions of the Food Administration, and intends to adopt the wheatless and meatless meal himself before long.

But now the time has come to sign up, and do all these necessary things, and upon readers of business journals like this rests a double responsibility. Business men are employers, managers, leaders. In a service like food saving they should enlist not merely themselves and their families, but their employes and subordinates. At the end of Food Pledge Week the membership of the United States Food Administration should be 100 per cent. of the people of the Nation. Be ready to "do your bit" that week—it will be the biggest sort of business, because it is to help win the war.

THE COAL PROBLEM.

Yes, it's with us again—the coal question. It may be as bad as it was last winter—even worse, if we don't begin working on every contributing agency at once, and keep hammering them. The recent price adjustment, effected by representatives of the government, the coal producers and the miners hasn't helped the public utilities a bit, either in costs or deliveries. It is up to us to impress upon the National authorities the importance of maximum efficiency for all the gas and electric companies. The proposition is plain enough and we rather think the National Council of Defense can be properly impressed with it, if our readers will write a strong statement of the facts to G. W. Elliott, Secretary of the National Committee on Gas and Electric Service, Munsey Bldg., Washington, D. C. Shipments of troops and supplies threaten to congest railroad traffic this fall more than ever, a number of miner strikes are in progress and some of the coal producers are evading the limiting price by shipping their output, not previously contracted for at higher prices, for export or tidewater disposal, to which the limit does not apply. As the government undoubtedly intends to treat fairly the utilities upon which the winning of the war so largely depends, it must grapple with this situation at once.

Natural Gas News

Oklahoma City Not Affected by Gas Shortage.

Oklahoma City is absolutely safe from any serious gas shortage this winter, according to a report made to the chamber of commerce directors by the gas committee, after an exhaustive study of the situation. The Oklahoma Natural Gas Co. promises to complete the twelve-inch line from Wellston to the Morrison pool which lacks seven miles of piping unless ten-inch material will have to be substituted occasioned by the commandeering of the government of most of the visible supply.

Logan National Gas & Fuel Co. To Meet Demand.

The manager of the Logan Natural Gas & Fuel Co. has announced that the company is in shape to give the people of its territory good service this winter. The company has drilled new wells and has more power at the compressing stations. While the company will not have sufficient gas for manufacturing purposes, there will be plenty for heating homes.

V. N. Vickery is the new manager of the Ohio Gas Light & Coke Co., Napoleon. O. W. I. Hartnett who formerly was in charge has been moved to Lawrenceville, Ill., where the same company operates another plant.

The Union Natural Gas Corporation has declared the regular quarterly dividend of 2½ per cent., payable to holders of record September 30.

Harry P. Hynds, proprietor of the Plains Hotel, Cheyenne, Wyo., reports that he has a franchise for a gas line into Casper, Wyo., but says no construction work will be done for a year.

Big Well Struck in Corsicana-Powell Field.

A gas well that is said to be flowing 10,000,000 feet of gas daily has been brought in in the Corsicana-Powell oil field at Powell, Texas. Its roaring can be heard for a long distance and great numbers of people went out from Corsicana to see the well. The well is owned by the Deep Sand Oil and Gas Co., of which Jesse Graves, of Corsicana, is secretary. It has caused considerable excitement and other developments will follow.

25,000,000 Foot Well Found in West Va.

The largest known natural gas well in West Virginia has been brought in by United Fuel Gas Co., a subsidiary of Columbia Gas & Electric Co., and is flowing 25,000,000 cubic feet a day. It is at about the center of a tract of 13,000 acres, the largest single tract in West Virginia fields.

World's Biggest Well Struck in Wyoming.

The Ohio Oil Co. has brought in a gas well in the Little Buffalo field of Wyoming, said to be the biggest in the world. It is flowing 80,000,000 cubic feet of gas daily. Gas was struck at 1,720 feet, with a 12½ inch hole.

Cleveland Faces Fuel Shortage This Winter.

Cleveland, O., faces probably the most serious fuel shortage in its history, according to coal dealers and officials of the Natural Gas Co. Fifteen thousand more patrons are being served this year than last by the gas company. Last year the shortage of gas resulted in considerable suffering.

Effect of Mixing Gases

Results of Experiments Mixing Manufactured and Natural Gas Given in Paper at Meeting of Pacific Coast Gas Association—Paper Condensed

By Frank S. Honberger

With the incoming of natural gas several factors will evidence themselves, which necessitate some minor research to make positive the practicability of its use as a mixture with artificial gas. Its use as a constituent of a mixed product is influenced by the lack of sufficient quantity to warrant its continual employment. The first question which confronts its adoption as a portion of a mixture is the possibility of stratification taking place when a gas of .70 specific gravity is added to one of .50 gravity. In order to gain information concerning the diffusion of gas, a method described in Traver's "Study of Gases" was employed by the writer. Quoting from text book, the following statement is made on the diffusion of gases: This term, though employed by Graham in describing the passage of a gas through a porous septa, should more properly be applied to the mixing of two gases brought suddenly into contact over a free surface. The subject was studied by Loschmidt of Vienna and the results published under the title of "Diffusion of gases without porous septa." A glass tube, 1,000 millimeters long and 55 millimeters in diameter, was divided in the middle by a thin steel shutter, in which a hole, equal in diameter to the inner section of the tube, was pierced. The two halves of the tube were filled with different gases and the shutter was moved so as to bring them in contact for a definite period of time. The degree to which the gases had mixed was determined by chemical analysis."

The apparatus used to verify the intimate mixing by diffusion and the non-stratification of the constituents of the mixed gases, consisted of 20 feet of 4-in. pipe, both ends plugged and a separating valve in the middle. Natural gas was charged into one-half of the pipe and artificial gas into the other. After charging either end with the gases in question, the separating valve was opened and the gases allowed to intermingle for 15 hours, when heat determinations were made. Results were as follows:

	B. t. u.
Top	658
	650
Middle	648
Bottom	651
	648

The artificial gas, of .50 specific gravity was introduced into the upper half of the 4-in. pipe and the natural into the lower portion.

To make positive that no stratification took place, the position of the gases was reversed, the natural gas being introduced into the top, and the artificial gas into the lower half of the testing unit. A tabulation of the work of one test is given below.

	B. t. u.
Natural gas	1,000
Artificial gas	625
Top	810
Bottom	813

It will be seen that a mixture evidently took place, since the lower half had a heat value of 1,000 heat units and the upper a value of 625 heat units. Upon allowing the two gases to intermingle, the heat values are equalized, but three heat units difference in the showing between the upper and lower ends of the pipe.

Photometric Observations.

After being assured that no stratification took place, considerable research was done to find the results of photometric observation upon various mixtures of natural and artificial gases, and to this end a series of such mixtures were made, ranging from 10 per cent. to 80 per cent. of the natural product. The various combinations were then observed for heating value and candle power, using a Junker's calorimeter and a Queen photometric bar, respectively. With the bar, a certified "Metropolitan Argand burner No. 2" was used,—since this burner is designed to give the best lighting results by the use of an air regulator.

A point, however, owing to air regulation, was reached, at which the above burner could not be used and an aluminum open tip burner was substituted. For mixing the gas, a 5-foot gas prover was used. The heating value of the natural gas was 1,050 B. t. u. and the candle power was 9.0 candles. Instead of burdening the reader with a detailed account of the results of the individual cases, a brief summary will present the information acquired. (See table in third column.)

An inspection of accompanying tabulation makes prominent the fact that although there is a constantly decreasing percentage of artificial gas the candle power is maintained up to the addition of 80 per cent. artificial gas. With a constantly decreasing artificial gas content, but a rising heat value, the ratio of the candle power to the heat units remains nearly constant up to a critical or breaking point.

A statement can be made at this point: With a gas of relatively high heating value, the candle power does not seem to depend upon the amount of carbon particles present, but upon the incandescence to which they are brought. This seems to be true up to the just mentioned critical point.

Mixing Large Quantities.

After having done the preliminary investigations upon gas mixtures in the laboratory and decided upon the practicability of their use, the question of mixing of larger quantities and controlling the proportions decided upon, arose. Any-one of three distinctly different methods may be used to give the results desired (i. e.), mixing the natural gas in oil gas generators while the generators are engaged in manufacturing artificial gas; using natural gas as an enriching medium for water gas, in place of oil; mixing natural and artificial gas on the way to the storage holders, measuring the natural gas before the mixing takes place. Of the three plans the last one is undoubtedly the most feasible, since in both of the first two, an enormous amount of heat would be required in bringing the cold gas to the temperature of the generating apparatus.

Per Cent. Nat. Gas	C. P. Art. Gas	C. P. Mixture	B.t.u. of Mixture	Ratio of C. P. in. Mix. to B.t.u. Mix
10	18.74	19.22	592	30.8
20	16.57	19.51	640	33.1
30	17.55	20.77	700	33.7
40	13.16	19.26	687	35.7
50	17.33	19.50	688	35.3
60	17.48	21.20	748	35.3
70	13.99	21.38	782	36.6
75	14.65	20.50	825	40.2
80	16.40	10.35	871	84.2

Natural gas as delivered to the meter station is usually at a pressure considerably in excess of that at which the artificial gas leaves the purifying boxes after being forced through them by the exhausters. Where station meters are being used the back pressure from the holders is the same against both the artificial and

Nathaniel Tufts Meter Works

455 Commercial Street

Boston

Established 1860

In New England there are ONE MILLION consumers GAS METERS.

35% or 350,000 are of the *Prepayment Type*

39% of our total meters sold in 1916 were *Prepayment*

We manufacture these under License from John J. Griffin & Company

McDONALD METERS

Noted for Accuracy

CONSUMERS METERS
REGULAR AND B TYPE

PREPAYMENT METERS
ADAPTED TO ALL REQUIREMENTS

STATION METER WORK
OF EVERY DESCRIPTION *with* A SPECIALTY *of*
THE HINMAN MEASURING DRUM

D. McDONALD & COMPANY

991 BROADWAY, ALBANY, NEW YORK

The MARYLAND METER

B. METERS

FOR INCREASED CAPACITY
UNDER SLOW SPEED OPERATION

STATION METERS
METER PROVERS, COMPLAINT METERS, ETC.

ARTIFICIAL AND NATURAL GAS METERS
PREPAYMENT METERS

MARYLAND METER WORKS

BALTIMORE, MARYLAND

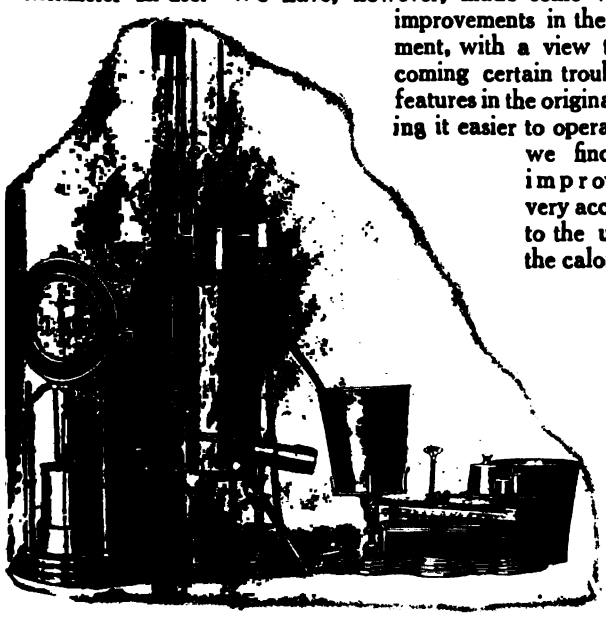
SPECIAL ATTENTION TO REPAIR WORK

NORTHWEST REPRESENTATIVES: NORTHWEST GAS EQUIPMENT CO.
1010 SPALDING BUILDING, PORTLAND, ORE.

The HINMAN-JUNKERS CALORIMETER

As manufactured exclusively by the American Meter Company

is of the same general design and operates on the same principle as the well known Junkers Calorimeter, which has heretofore been regarded by gas experts as the most satisfactory form of calorimeter in use. We have, however, made some valuable improvements in the instrument, with a view to overcoming certain troublesome features in the original, making it easier to operate, and we find these improvements very acceptable to the users of the calorimeter.



This Calorimeter, with its accessories, is constructed in accordance with the recommendations made by the Committee on Calorimeters of the American Gas Institute. It also has the approval of the Public Service Commission of the Second District, Albany, and has been found by them to give accurate results.

This Calorimeter is now furnished with baffle plates for burner, in accordance with the latest recommendations made by the Committee on Gas Calorimetry of the American Gas Institute and of the Bureau of Standards, Washington.

This Calorimeter is also now made so that it can be taken apart, making all parts accessible. Metal tubing is also used in making the connections.

Complete Details and Prices on Application

The American Meter Company

Established 1834

Western Office: Peoples Gas Bldg. Chicago

New York Philadelphia

the natural gases, so that, with the latter delivered to the mixing station at a higher pressure than the former it is necessary to reduce this pressure by permitting the natural gas to expand into an expansion drum—the quantity expanded being governed by a valve in the natural gas supply line. In order now, to maintain the ratio demanded, close attention to the meters registering both gases is necessary. That it can be done with extreme accuracy is indicated by the fact that for months the ratio has not varied 1/2 per cent. either way of the desired proportions.

Naphthalene Removal.

In maintaining the heat value of the gas as required by my franchise and also the percentage of the natural product demanded in the mixture, the artificial gas generators are operated at heats which tend to produce considerable naphthalene. Before mixing with the natural gas this naphthalene is entirely removed in the scrubbing since the natural gas acts only as a solvent of this compound and tends only to decrease it in proportion to the ratio of the mixtures of the two gases.

Leaving the point of mixing and entering the distribution system especially after the gas has passed through the compressors the decrease in the amount of drippage over a 600 B. t. u. artificial gas is noticeable. It is easily understood since the artificial gas in the mixture has been generated at high heats and the complex oils originally constituting the drippage have been cracked to fixed gases and thus eliminated from the condensate. Not only is this due to the decrease in the artificial gas made but also to the fact that this article has been decreased in volume dependent on the proportion of natural gas added.

Effect on Meter Diaphragms.

In switching from a 600-heat unit artificial gas to a mixed gas of artificial and natural, the leather diaphragms in the consumers' meters immediately showed the effect of the change and several diaphragms were examined. After making a series of observations upon these leathers a theory was evolved from the deductions made which has probably covered the phenomena noticed. Drippage, or condensate from a meter containing an exceptionally large amount, was examined and found to consist of a considerable quantity of a blue sludge or muck and a small quantity of benzole. This is probably a misnomer since the gravity of this oil was 35.4° Bé while true benzole has a gravity of 28°—29° Bé at 60° F.

Upon acidifying the sludge with hydrochloric acid it was found difficultly soluble and gave evidence of a dark green approaching to blue color. This sludge, upon being heated with caustic potash, lost its blue color and a heavy precipitate of ferric hydroxide was thrown down. Upon leaching the dried leather with carbon tetra-chloride and distilling off the solvent, no evidence was found of any mineral oil, though, of course, some animal oil was present. The leather itself was dyed a decided blue. From the foregoing observations, the following course of reaction of the artificial gas upon the diaphragms was deduced.

Artificial gas, coal or oil gas, contains some cyanogen compounds, which consist of carbon and nitrogen. These compounds, coming in contact with water, are dissolved and are naturally found in the condensation or drippage. In contact with the interior of the meters these liquid cyanogen solutions form iron salts, which are evidenced by the deep green or blue coloring of the sludge and the leather of the diaphragms. In composition these cyanogen salts of iron are probably akin to prussian blue. Further evidences of this action of the cyanogen compounds in the gas is found in the pipe scale, which at times stops small services, or scales and corrodes valve stems in some of the larger mains. All of these pipes scales contain large amounts of prussian blue.

To summarize, the following facts can be accepted: Dry gas,—artificial mixed or natural, has no effect upon the diaphragm. It is only when a large amount of condensation is present in artificial gas that the injurious effect is noted, since those detrimental constituents of the gas are put into such a form as to be chemically active. An artificial gas, entirely devoid of those obnoxious constituents, would have no injurious effect upon the diaphragms, even though it did carry a large amount of moisture. In the case of a mixed gas, the natural gas, which is practically inert, simply acts as a diluent and also as an absorbent for the excess moisture, in which case the moisture is carried through the meter to the burner. To say that natural gas has an injurious effect upon a diaphragm used with artificial gas is purely a matter of personal opinion. Granted that by drying out the moisture the leather is stiffened and the meter slowed down, can scarcely be said to be injurious. If the leather has suffered any actual injury, such as shrinkage of the tissue, it has occurred before the natural gas has come in contact with it. This has been caused by the astringent effect of the dissolved obnoxious constituents of the gas.

Effect on Appliances.

Coming now to the real subject matter in hand, the effect of a change in the quality of a gas upon the consuming devices in which it is to be used, the best possible manner of treating the problem is to generalize. In itself it is a rather difficult proposition upon which to do any extensive research, for the reason that the problem simply resolves itself into the application of various facts which apply to the phenomena of combustion. Let the person to whom the problem of solving the effect of a change in the heat value of the gas with which he is dealing become cognizant with the bunsen burner and the manner in which combustion takes place, no difficulty is experienced. Whether the burner be a star, a ring—pipe or pedestal—the same general rules hold for the combustion of high or low heat value gases to be consumed by the respective device.

With the change in the quality of gas naturally a different set of conditions come into existence so that a burner adjusted for a gas of certain heat value and gravity must be so altered in adjustment to burn the new gas to be consumed. The factors influencing this change are first the alteration in the composition of the gas and next the amount of air necessary to properly consume the new gas—both primary and secondary air must be taken into consideration.

Adjustment of Burners.

With the assumption that the heat value of the new gas has increased, the explanation of any change necessary in adjustment, will be simplified. As previously mentioned one of the factors influencing the change in adjustment of a burner, is the composition of the gas. This may be evidenced by the increase in specific gravity, going on the supposition that this increased weight is due to an increased percentage of hydro-carbons and not carbon-dioxide. A burner usually has been designed to burn a gas of a certain heat value—and within certain ranges, will do so efficiently and economically—but beyond this range, is overloaded. A simple comparison is to imagine a burner to be the fire box of a boiler which has been designed to handle a certain amount of fuel. Introducing into this burner, through an aperture originally designed for a gas of a certain quality, a gas of increased calorific power, is identical with increasing the depth of a fire on the grates beyond the ability of the fire box to consume it. Still applying the simile of the fire box, the grate surface is sufficient to properly care for a certain amount of carbon or hydro-carbons. The same is true of the gas burner—it, too, is designed to properly consume a certain weight of gaseous hydro-carbons and beyond this weight it is overloaded, if the orifice or aperture is unchanged. If the slight effect of the increased gravity of the gas upon the volume flowing through an orifice be disregarded, it will readily be seen how a greater weight of combustible will be admitted to the burner with the increase specific gravity of the gas.

The foregoing has been but a brief review of what the conditions would be

were an attempt made to use a richer gas in a consuming device designed for a leaner fuel. To meet the change it can readily be seen that the needed alterations consist in simply cutting down the amount of richer fuel admitted until it approximates the same weight as that of the leaner fuel for which the burner was originally designed. To cut this volume down, if the orifice is adjustable is an easy matter, if a spud, it can be hammered.

The problem does not, however, consist only in the permanent adjustment of the burner for a higher calorific gas but in meeting the extreme conditions accompanying the sudden change caused by a variation of from 200 to 500 heat units. With such extremes a happy medium must be chosen which will permit safe consumption until proper economic adjustment can be made. With open burners the danger lies in extinguishing the flame only, with the oven, however, the possibility of an explosion is always imminent, because of the fact that the oven is not designed to carry away the products of combustion or partially consumed gases such as would be formed with an excess of gaseous fuel introduced in the case of gases of high calorific value. The "smothering out" of a flame is the difficulty encountered in oven burners and is the most difficult with which to contend. To alleviate this difficulty the oven flues must be increased in area as well as adjusting the burners.

The Three Largest Gasholders in the World.

For many years the South Metropolitan Gas Co., of London, held the record in building large gasholders, with the East Greenwich holder with a capacity of 12,000,000 cubic feet. Then New York wrested the honor, with a holder of some 14,000,000 cubic feet capacity. Now London must take third place; for at Sydney, the Australian Gas Light Co. has brought into use a holder with a capacity of 12,750,000 cubic feet. The Sydney holder was erected by C. and W. Walker, Limited, in a tank hewn out of the solid rock by W. Solomon & Sons, of Sydney.

New Apparatus for Determining Specific Gravity of Gas.

T. R. Weymouth, chief engineer of the United Natural Gas Co., and S. S. Wyer, consulting engineer of Columbus, O., together with the Bureau of Standards at Washington, D. C., have invented a new instrument for the measurement of the specific gravity of gases, which will shortly be given to the scientific world gratis.

Wm. Gaffney Dies

William H. Gaffney, widely known throughout the gas industry as secretary of the Eclipse Gas Stove Co., of Rockford, Ill., a citizen highly esteemed in his city and state for his public spirited enterprise and sterling character, died unexpectedly Oct. 2nd of pneumonia. He was George D. Roper's close personal and business associate and friend and the entire gas fraternity will share with Colonel Roper and his companies their sorrow at the loss of Mr. Gaffney.

Mr. Gaffney started with the Eclipse Gas Stove Co. in 1889 and by loyal service and strict attention to his duties was advanced until at his passing he was secretary of the Eclipse Gas Stove Co., secretary of the American Foundry Co., secretary of the Rockford Vitreous Enamel Manufacturing Co., and secretary and treasurer of the Trahern Pump Co. He was a member of the Rockford Chamber of Commerce and of the Public Welfare association.

"I feel as though I had lost a son," said Col. Roper, in speaking of Mr. Gaffney. "Mr. Gaffney went to work for me in 1889 at $40 per month, and when he died his combined salaries would equal that of any man in Rockford, and he had an interest in all the companies. Mr. Gaffney and I differed in politics and religion, but I never allowed politics nor religion to be talked in the office. In all the years we have been together, despite these differences, we never had an argument of any kind and in business matters we never disagreed."

Mr. Gaffney was forty-five years of age and leaves a widow and four children.

CONSTRUCTION NEWS

New Gas Plant at Bellefontaine, O., Ready in February.

Bellefontaine (O.) will have a new municipal gas plant completed and ready for operation on or about February 1. Contractors have agreed to finish their work by that date. The Gas Machinery Co., of Cleveland, O., which has the contract to furnish about $60,000 worth of gas making machinery, will install the apparatus. The new building will be of steel, asbestos and brick. The new plant will cost, when completed, about $85,000. The bond issue provided is for $85,000.

Burlington, N. C., is to have a gas plant. The Burlington Gas Co. has been organized with J. B. Lydecker, president; capital stock, $100,000; trustee, Alamance Insurance & Real Estate Co.; length of pipe, 9 mi. 8, 6, 4 and 2-in.; capacity of holder, 60,000 ft.; now ready for material; engineer and contractor, B. Van Steenburg, Room 1022, 26 Cortlandt St., New York.

The Binghamton (N. Y.) Gas Works asks permission to lay gas mains, etc., in the village of Port Dickinson and seeks approval for the exercise of a franchise previously received from the village.

George H. Cressler, consulting engineer of Chicago, has been engaged by the Hibbing, Minn., council to draw up plans and specifications for the new municipal gas plant which probably will be located south of the Brooklyn section.

Leominster (Mass.) Gas Plant Put in Fine Condition.

The improvements at the Leominster (Mass.) gas plant are about completed. This work, including the installation of new boiler with extension to boiler house, and the addition of a new blower, scrubber and booster, will put Leominster in first-class condition to meet any demand.

Daytona, Fla., Rushes Work on Plant Improvement.

Work on the Daytona (Fla.) Public Service Co.'s plant is beginning to show results and the new machinery will shortly begin to arrive. The foundations and buildings are about ready to house the new apparatus,and every effort is being made to have the entire plant complete for the coming winter's drive. Work on the erection of the new gas holder will start about September 15, and it is to be completed by December 1.

To Alter Boiler House at $10,000 Cost.

The Milwaukee Gas Light Co. has obtained a permit to make interior alterations in the boiler house of the plant at Milwaukee and Menomonie St., to cost $10,000.

New Water Gas Set Planned for Arlington, Mass.

The Arlington (Mass.) Gas Light Co. contemplates a contract for a new nine foot set of water gas apparatus to be installed at the Grove Street Works.

City Gas for Power Purposes

Gas Engines for Generating Electricity a Promising Development for the Gas Field Says British Officer at Pacific Gas Ass'n Meeting—Abstracted

By Capt. R. W. A. Brewer
British War Department

Every town in England, down to almost the smallest village, is supplied with gas, generally from the plant and mains of a private company. These gas installations have existed until the last few years without serious rivalry from electricity undertakings of the large corporations or municipalities. Municipal gas undertakings are rare, as the pioneer work has been done privately. As soon as electricity began to make headway, the gas undertakings commenced a serious fight for existence. Being first in the field, however, they had in many instances got well in touch with the power users, and, not only so, but the gas companies and gas engine makers have been able to persuade prospective users of electricity that that commodity could be produced more cheaply by means of private installations, using city gas for the fuel, than by purchasing current direct from the electrical concerns. There is, of course, the capital cost of the gas-electric plant to be taken into consideration, but in spite of this the gas companies have been able to bring their price of gas, for power, down to such a figure that the entire outlay for the generating plant has been well justified.

Gas engine builders in England at once saw that there was a large possible demand for engines to be used solely for driving dynamos, and they at once put on the market special types of engines for this purpose. The single cylinder horizontal gas engines, which were up to that time practically universal, did not give a sufficient regularity of fly-wheel rotation to meet the demands of the electric light user, this was particularly noticeable at all loads below the maximum; consequently, there was a noticeable fluctuation in the brilliancy of the illumination at those times when the engine fired or missed as the case may be.

Early Development of Gas Engine.

The first step taken in departure from the early practice was to increase the diameter of the fly-wheel and the mass of its rim, by making a single large wheel eight feet or more in diameter with its shaft supported on an outer bearing; this was for medium and larger sized engines. The rate of rotation also was increased from the normal of about 180 r.p.m. to 250 or thereabouts. This was the practice about the year 1900 when the author was engaged in the gas engine industry. At that time also porcelain tube ignition was universal, as also the hit and miss system of governing. Since that time magnetic ignition has replaced the tube, which latter was liable to burst, and the regularity of rotation has also been improved by the use of a throttle governor, that employed by Crossley Brothers of Manchester being of a particularly interesting type, as it operates the admission valve lift by varying the position of the fulcrum in a very simple and ingenious manner.

Relative to the regularity of revolution, the peripheral speed of the fly-wheel rim should not vary momentarily more than one per cent. under all working conditions, this will obviate the necessity of fly-wheeling the dynamo, an early practice.

As an example of the extent of the use of gas-electric installations in England, the author is personally acquainted with a very large number of these situated in the basements of shops throughout London, many of which were installed with considerable difficulty on account of the lack of available space. A number of these installations were put in under the author's personal supervision and not only had pavements to be torn up, but very considerable depths of excavation carried out in many instances in order to reach a solid bottom below the made-up ground on which large areas in London are built near the banks of the river Thames. All the expenses in connection with these works were amply justified, even though the price of gas in London at the time was considerably higher than that in other towns in the north of England, and, speaking from memory, this was about 80 cents per 1,000 cu. ft. This gas had a calorific value of about 520 B.t.u. per cu. ft., and the engines at the time consumed about 20 cu. ft. per b.h.p. hour. Giving a comparison with electricity, the very cheapest rate in London offered by one company at the beginning of the present war was three cents per Board of Trade unit of 1,000 watt hours for power purposes. Generally, the price was about seven cents for power and 11 cents for lighting. The price of gas on the other hand in towns was about 50 cents to 90 cents per 1,000 cu. ft., but in very small towns occasionally as high as $1.75. Most of the gas companies in England give a large reduction in the price of gas for driving engines and this has been of vast benefit, not only to the gas companies by enabling them to increase their output and partially equalizing their output throughout the twenty-four hours, but it also has been an inducement for the consumer to become such and for the engine builder to sell him an engine.

Conditions in United States.

While discussing the comparison between electricity and gas, we will for a moment look to the converse side and see how costs compare for power purposes. In America the gas engine for power purposes has a comparatively small place and this is due to many causes, the principal of which, from the author's viewpoint, is that the distribution of electricity in this country is carried out to a very much greater extent in industrial areas than is the distribution of gas. The small user of power is able to attach an electric motor to his mains with very little trouble and it requires practically no care or maintenance. In England, on the other hand, the small man looks to the gas company to furnish him with power and there is scarcely a street in London, for example, that has not a gas engine working in it.

Costs of Gas vs. Electricity.

Before proceeding, let us for a moment study a table of costs for power from gas or electricity. This table is based on the cost of gas at various figures and on the assumption that the engine consumes 17.5 cu. ft. of gas per b.h.p. hour. On the electric side, the

price of electricity per unit is taken from one cent to six cents and the two columns show the cost per b.h.p. hour with a motor efficiency of 80 per cent. or 90 per cent.

COMPARATIVE COSTS OF GAS AND ELECTRIC POWER.

Cost of City Gas per 1000 C. F. Cents	Cost of Gas Power—Cents per B.H.P. Hr.	Price of Electricity per Kw. Hr. Cents	Cost of Electricity per B.H.P. Hour Cents Motor Effy. 80%	Motor Effy. 90%
.24	0.42	1.0	0.922	0.828
.36	0.63	1.5	1.42	1.244
.48	0.84	2.0	1.86	1.66
.60	1.50	2.5	2.214	2.06
.72	1.26	----	--------	-----
.84	1.47	3.0	2.8	2.48
.96	1.68	----	--------	-----
1.08	1.89	4.0	3.74	3.32
1.20	2.10	5.0	4.66	4.14
1.32	2.30	----	--------	-----
1.44	2.52	6.0	5.6	4.96

Application of City Gas for Power.

There is no reason why gaseous fuel could not be used for power purposes in America in very many instances where the price of liquid fuel is becoming of considerable moment. Internal combustion engines can be supplied with fuel in the three different forms in which it is found in nature: solid, liquid and gaseous, the latter being the original form in which it was found possible to burn fuel in the cylinders of an engine. As the development of this type of engine went on, liquid kerosene was found to be a possible fuel, and experimentalists have since gone further in the utilization of coal dust as a means of operating an internal combustion engine. The author is not, however, acquainted with the latest developments of the solid fuel engine as it is sixteen years since he saw a practical engine of this type at work in the Glasgow exhibition. This engine, however, was not a commercial success.

Whatever form fuel is in when it is actually brought to the engine, the first function of the engine or its accessories is to convert the fuel into gas as nearly fixed as possible, before admission into the cylinders. The reason for this is obvious, as in order to burn the fuel with the maximum economy and completely, every molecule of hydro-carbon must combine with the necessary amount of oxygen; the working fluid, therefore, must be homogenous and this only can be obtained when it is divided into the smallest particles possible. When the gas is homogeneous throughout, the strength of the mixture need only be such that, when under compression, the mass of the whole of it will be combustible. The mixture strength therefore can be at a minimum value when using gas, while on the other hand, when a liquid fuel is employed, there is always some uncertainty as to whether the mixture strength in any one part of the cylinder will be the same as at any other part. For example, if the ignition plug is situated in a pocket, it will not be certain that the portion of the working fluid which is in the pocket will at every time burn at the moment of ignition. In order, therefore, to avoid such uncertainty, it is usually the practice to adjust the mixture slightly on the rich side so that regular ignition will be insured. This is one point in favor of gasification.

An engine, designed to run with gas, has a greater compression ratio than a kerosene or gasoline engine, because, on account of the incompleteness of combustion in the liquid fuel engine, there is a tendency for the precipitation of carbonaceous matter on the hot surfaces inside the cylinders. This is more pronounced when liquid is used by reason of the cracking of liquid particles in suspension when they come in contact with the heated surface of a piston, exhaust valve, etc. It is unnecessary to point out to you the effects of carbonaceous deposits as every motorist is fully acquainted with them, but what does interest us is that they limit the possible compression which can be used and consequently the thermal efficiency of an engine.

Results of Gas Engine Tests.

The author has recently been conducting some tests in this state (California) with a view to adopting gas for engine testing, principally with a view of eliminating the serious formation of carbon deposit in the cylinders and upon the pistons of engines on test, and to prove to a certain form of manufacturers that city gas was preferable even to distillate for testing and running in new engines. A few results of these preliminary tests are given in the accompanying table, but no attempt was made to employ any form of mixing device, so that the results do not indicate finality. The gas was admitted through one branch of a Y-pipe and the air through the other, a pair of cocks being manipulated to adjust the mixture strength to give the best results. The analysis of the gas supplied is approximately as follows:

CONSTITUENTS	CHEM. SYMBOL	PER CENT BY VOLUME
Heavy hydrocarbon	$C_n H_{2n}$	4 %
Marsh gas	$C H_4$	50 %
Hydrogen	H_2	15 %
Carbonic oxide	C O	7.4%
Carbonic acid gas	$C O_2$	¼ %
Oxygen	O_2	.9%
Residual nitrogen	N_2	22.2%
	Total	100 %

Specify gravity (air-1) calculated.... .652
Gross B. t. u..... .693

An installation of gas mains has at time of writing been completed and is the first of its kind in California, being constructed of steel casing tubes welded together by the oxy-acetylene process. A 16-in. main runs down the street four blocks away and a 10-in. main has been laid to the engine house where the pressure of the gas is 4½ inches of water. A 10-in. manifold is built ahead of six 150-light A meters each capable of dealing with 3,400 cu. ft. per hour, the meters being arranged in banks of two in parallel on 6-in. connecting pipes across an inverted U 10-in. main. The gas thence is led to a ring main supplying the engines, one leg of the ring being 6-in. where connections are tapped off for running engines on no load and the other leg being 10-in. where the gas is supplied to the loaded engines. The engine connections are made of 2-in. couplings cut in half and welded on to the mains, so that there are no joints in the system.

It is anticipated that the cost of working will compare very favorable with the previous practice where distillate was employed in spite of the fact that the price of the liquid fuel has been as low as 8½ cents per gallon.

RESULTS OF ENGINE TESTS WITH CITY GAS.

Revs. Per Min.	B. H. P.	Gas: Cu. Ft. Per Min.	Gas: Cu. Ft. B. H. P. Hr.	Thermal Efficiency Per Cent	
525	76.6	51 lbs. gasoline	0.665 lbs.	19.2	
535	65.4	24.9	22.8	16.9	
558	58.6	20.4	20.9	18.4	
546	41.0	16.5	24.2	16.1	¾ load
547	27.3	13.7	30.0	12.9	½ load
534	55.2	21.2	23.1	17.8	
538	40.3	16.6	24.7	16.3	¾ load
580	29.0	13.2	27.4	13.3	½ load
577	13.9	12.5	54.0	7.45	¼ load
544	No load	6.4		No	Light

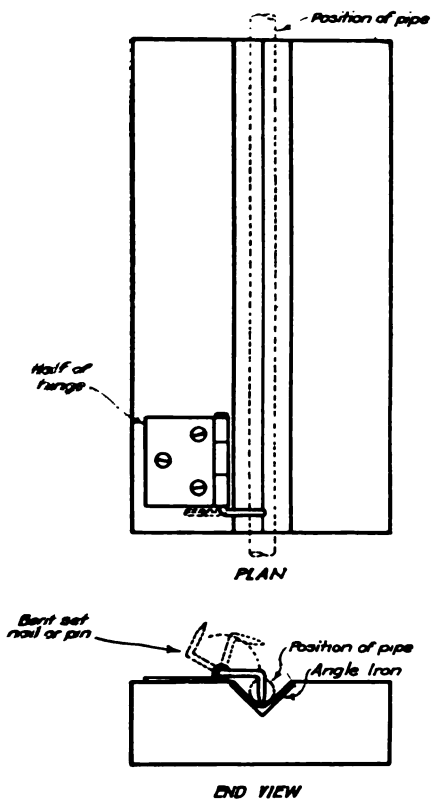
Tips for Gas Men

A Few Successful Wrinkles Tried by Pacific Coast Utility Companies

At the annual meeting of the Pacific Coast Gas Association, Sept. 18-21, many good wrinkles for gas companies were submitted. A number of these were published in our last issue and several more follow:

Drilling Holes in Pipe.

We frequently have found it necessary to make drilled pipe burners special sizes which could not be purchased. If you have ever tried to drill a number of holes uniform in size and distance in a perfect line in a pipe, you



For Drilling Holes in Pipe.

will appreciate that you have a job on your hands. When we were making many special installations it was necessary to facilitate this work, so we made a little contrivance which I think will be of interest and is surely a great labor saver: A block of wood about 18 inches in length, three inches thick and about five inches wide; imbed in this a piece of one-inch angle iron so that the two top sides of the "V" are flush with the board. About three inches or four inches from the end of the board place half of a hinge, using a set nail or pin bent so that the pointed end will strike the center of the "V." Your pipe holder is then complete. Clamp same to your drill press, lay your pipe on the "V," drill your first hole and measure and mark distance for the next hole. Then by moving your set pin from the first to the second hole, other holes can be drilled by simply moving your pipe and placing the pin in the last hole drilled.—H. J. Kester, Los Angeles Gas & Electric Corp.

Jumper on Gas Meter.

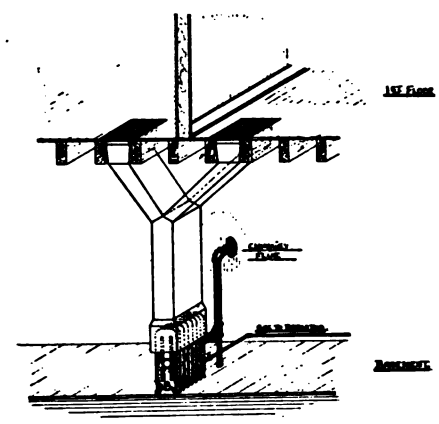
The direct current "ground" current returning from street cars to the generating station always follows the path of least resistance. In so doing it frequently follows gas systems and water systems. It sometimes happens that a slight difference of potential exists at certain points between a gas pipe and a water pipe which will cause an interchange of current between the two when they are metallically connected, as they are at all such appliances as gas water heaters. When this condition exists an appreciable amount of current will flow in varying quantities from gas system to water system or vice versa, until such a time as the metallic connection between the two is broken, which may be when the gas meter is removed (assuming that the gas water heater has not been disconnected). This opening of the electric circuit produces a small electric arc which is liable to ignite the gas and cause explosion or fire. Our gas service men frequently find such cases. Their attention is called to them by a plainly discernible spark at the moment they connect or disconnect the meter. Very fortunately most of such conditions are discovered before any accidents occur. To eliminate the possibility of trouble when again working on such a meter, a heavy copper "jumper" or electric by-pass is connected to the two pipes on either side of the meter, the ends of this wire being well soldered to the pipes. The copper wire affords a continuous path for the current, which is of much lower resistance than the pipe itself and this eliminates the possibility of electric arcs when removing or replacing the meter in the future.—A. V. Brandt, superintendent electric distribution, Pacific Gas & Electric Co., Oakland, Cal.

Repairing Gas Holder in Service.

Several years ago one of our gas holders sprung a leak between the two sheets on the side, caused by the rivets crystallizing and breaking. A permanent repair was made as follows, with out putting the holder out of business. A piece of round iron, slightly smaller than the rivet hole and 1½ inches long, was threaded down to center, at which point rod was bent at right angles. The plain end was inserted through rivet hole, bringing it flush with inside of holder plates. Candle wicking saturated with red lead was placed around threaded end, two washers applied and nut screwed tight. An effective joint was made, which extended about two feet, screw-rivets being inserted in each rivet hole.—Claude H. Weber, Manager Southwestern Gas Co., Hemet, Cal.

One Hawk's Heats Two Stores.

This wrinkle developed in a stationery store where two small offices were to be heated, and where space could not be spared for radiators and where the cost of radiators for each office would make the job too expensive to



Heating Two Stores with One Radiator.

be accepted. As there was a convenient flue connection in the basement and one radiator being capable of heating both offices, I found that an installation as shown in the accompanying sketch, answered the requirements in every way. Conditions similar to the above are found quite frequently and while the idea is not new or original, it might be found serviceable in a great many cases.—William L. Connor, Pacific Gas & Electric Co., San Francisco.

Care of Rubber Hose.

As rubber hose connections used on your gas analysis apparatus deteriorate very rapidly, a coat of shellac will add to their life.

If reserve supply of rubber hose used in laboratory is kept in air-tight can, it will keep longer.—A. J. Rix, Pacific Gas & Electric Co., San Rafael, Cal.

The Worcester (Mass.) Gas Light Co. gained 910 consumers last year and sold 1,055,061,000 cu. ft. of gas, or 8.97 per cent. more than the year before.

PROBLEMS IN THE GAS BUSINESS

Conducted by W. M. Henderson, Assistant Engineer Gas Department, Pacific Gas & Electric Co., San Francisco.

ANSWERS TO QUESTIONS.

229—Black Ammonia Salts.

How do you account for the black salt formation in sulphate of ammonia?

This is attributed to the formation of the black salts in question to the small quantities of iron which always exist in the form of sulphate in the sulphuric acid employed. Sulphate of iron is much less soluble than sulphate of ammonia; consequently, if a concentrated solution of sulphate of ammonia in sulphuric acid containing iron is neutralized with gaseous ammonia, the iron will crystallize and deposit.

When the acidity of the solution decreases to such an extent that the slow circulation in the saturator gives an alkaline solution localized around the gas intake, or if there are obstructions due to the accumulation of salts through which the gas must make a passage, the result will be that the sulphureted hydrogen and ammonia will act on the sulphate of iron crystals in the sulphate of ammonia and produce a black precipitate of sulphide of iron.

In addition to this reaction, the sulphide causes the formation of insoluble ferrocyanide of ammonia. Mixture of the two precipitates forms a black yellowish mass, which is hardly soluble in sulphuric acid and which, to a large extent, constitutes the black matter that colors the sulphate of ammonia. A very small quantity of this mixture in the sulphate turns it black.

Under the combined action of sulsulphureted hydrogen and ammonia, a reaction occurs which results in the formation of a double soluble ferrocyanide of ammonia and insoluble sulphide of iron. The former can then be filtered through the salt crystals until it comes into contact with the acid portion of the solution, where the action of the sulphuric acid will again precipitate the single insoluble ferrocyanide of ammonia. The sulphuretted hydrogen. in presence of the sulphuric acid in the solution, can produce a sulphur precipitate which will mix with the sulphide of iron and insoluble ferrocyanide of ammonia to form the insoluble mass which blackens the precipitate.

230—Back Pressure in Purifiers.

Our oxide purifiers give us more trouble due to back pressure than lime boxes did. What causes this? How is it possible to determine the value of a batch of new oxide?

A—One of the drawbacks associated with the use of oxide in the purifiers is the fact that the pressure thrown by a box sometimes rises rather rapidly and to such an extent that, to prevent its lutes blowing, a box has to be taken off and emptied, although the material is by no means completely fouled. This does not happen to any corresponding extent with lime; in fact purifying foremen of long experience on large works, who have repeatedly had to change oxide boxes because of rapidly rising pressure, will in many cases be able to say that they never remember changing a lime box under these circumstances.

In such cases the material is found to be lying very densely and in fact caked into a hard mass that may need a pick to break it. The absorption of sulphuretted hydrogen gives out heat, and if air is admitted along with the gas for partial revivification this change also develops heat. Consequently the material gets drier, and tends to creep down and lie more compactly. Tar and napthalene also may settle out in the material, and these also will tend to cake it. To a large extent these causes hold good of lime, so some more important factor must be present in the case of oxide. This, in most cases, is probably the sulphur deposited when the used oxide was revivified. This is in a finely divided condition, and if the temperature in the boxes is allowed to rise somewhat unduly, it softens, partly fuses, clings to the earthly material and forms a mass through which the gas has a greater difficulty in passing.

B—The constituent in oxide that removes sulphuretted hydrogen from the gas is mono-hydrated iron oxide, but specimens of oxide cannot be valued simply according to the percentage of this compound that is present. Still less does the mere percentage of iron decide its value, as this may not all be found in the form of the one compound that is most active in gas purification. Nevertheless this quantitative analysis in order to find the percentage of iron is often employed, though it may by no means give a correct forecast of the value of the oxide in actual operation.

An all-important consideration is the physical condition of the oxide, whether it is porous and will allow of a free passage of air. This largely depends on the amount of vegetable fibre present, the ideal bog ore having the iron oxide deposited on the strands of the peat. The suitability of its physical condition can only be ascertained with any degree of accuracy by actually using the oxide for purification, though not necessarily on the large scale.

The plan most usually adopted for valuing oxide is as follows: First estimate the percentage of water in it by the usual laboratory method, viz., weighing a sample, drying it in an oven at steam heat and then weighing again. Secondly, submit a quantity to the passage

This department will supply information on problems arising in every department of the gas industry. Your co-operation is solicited, both in asking and answering questions. Address: W. M. Henderson, Pacific Gas & Electric Co., 445 Sutter St., San Francisco, Calif.

NEW QUESTIONS.

237—Water Heater Campaign.

What experience have gas companies had with direct mailing campaigns for the sale of automatic gas water heaters? What success? Were letters used or mailing cards and if so were these pieces mailed under regular postage covers or were they delivered by gas company employes?

238—Connecting Water Heaters.

What is the usual charge for connecting a No. 65 Pittsburg, a No. 4, 6 and 8 Ruud, Humphrey or Pittsburg? Are installations made with a view of making profit on installation work as well as heaters or on heaters only?

239—Labor Installing Heaters.

How many men would it require to install a No. 4 automatic gas water heater and how long on average reheating job? How long on average direct job?

240—Sale of Water Heaters.

What experience have gas companies in large cities had with direct mailing campaigns that were not coupled up with newspaper advertising? Could success be expected from campaigns consisting of mailing pieces only, with no newspaper advertising and no special window displays or store demonstrations?

241—Results of Heater Campaign.

What per cent. of automatic gas water heater sales are made by direct canvass; by customers calling at office; by prospects secured by mailing literature?

242—Automatic Heater Sales.

Do you believe that the average buyer of automatic gas water heaters can be reached by a house to house canvass?

243—Price Water Heaters.

What is the usual charge for automatic gas water heaters, list or list plus a fixed installation charge?

244—Fire-Proofing Wood.

What application can be made to wood to make it resist fire?

245—Graphite.

Is graphite, used as a refractory material, produced artificially or it is found in the natural state?

of foul gas, or a stream of specially generated sulphuretted hydrogen in some convenient form of small apparatus until it has had ample opportunity to become completely fouled. Now remove the oxide and revivify it. A fair sample of the material then is dried and analyzed in the usual way, and the amount of free sulphur determined that the oxide can take up in its first fouling. The rest of the revivified material can be fouled a second time and treated in the same way, and the process continued until the sulphur contained in the oxide has reached the figure at which the material usually is sold. A complete record thus is obtained of how the oxide is likely to behave at its several foulings.

Of course, the material at each time of fouling is brought to just the necessary state of wetness, and as the extent to which moisture is removed in each fouling varies, it is essential for correct estimation of the work accomplished that the percentage of sulphur shall be estimated on the dry basis each time, and not on the wet basis, as when the oxide is finally sold.

232—Corrosion.

Why does iron corrode so rapidly when laid in a bed of cinders?

Cinders are found to be extremely corrosive in their action on iron as well as on other metals buried in them. This is, of course, because they are porous and filled with gases. The two gases that are contained in greatest abundance are carbon dioxide and sulphur dioxide, the latter being formed by the burning of the iron pyrite $Fe\ S_2$ that exists as an impurity in the coal, and the former by the burning of the coal itself. Both gases are acid anhydrides, and as the water from the rain or other source percolates through the cinders, it unites with them to produce acids. Although not strong acids, they nevertheless ionize to a certain extent and bring about accelerated corrosion.

Contact with cinders will bring about the corrosion of metals that are far more resistant than iron. For example, even lead is quite rapidly acted upon. This corroding influence must be remembered in laying pipe lines for any purpose through cinders, as, for example, railroad embankments, or gas works yards, etc. The metal must be encased in some way that it will be kept perfectly free from contact with the water that percolates through the cinders. If it is possible to use such, it would be better to substitute entirely some fiber or wooden pipe conduit or wrap the pipe line with such material.

REPEATED QUESTIONS.

233—Thermite.

What is the reaction that takes place when Thermite is used for welding, the welding temperature obtained, and is it suitable for use on all metals?

234—Gases.

What are the constituents, explosiveness and characteristics of these gases: Air, sewer gas, coal gas, coke oven gas, town gas, gasoline.

235—Aluminum Solder.

What kind of solder can I make to use in joining aluminum sheets?

236—Slacking Lime.

What takes place when slacking lime and what care must be taken in order to get a good quality of slacked lime?

TO PROMOTE LOAN.

Strong Committee Named To Work Among Machinery and Tool Trades.

The Machinery and Machine Tool Trades Committee for the promotion of the second Liberty Loan among the members of that fraternity has established headquarters on the 16th floor, 334 Fourth Ave., N. Y. C., and manufacturers of machinery and machine tools, as well as their employes, are asked to communicate with the secretary at the above address for full information, subscription blanks and other material. The personnel of the committee is such as to warrant the greatest confidence in the outcome of its efforts.

Governor Strong, of the Federal Reserve Bank, appointed J. W. Lane, president of the E. W. Bliss Co., chairman of this division for the city of Greater New York. Chairman Lane called together the following men, prominent in the machinery world, to co-operate with him: Henry Prentiss, president Prentiss Tool and Supply Co.; George Doubleday, president Ingersoll-Rand Co.; R. L. Patterson, president American Machine & Foundry Co.; C. I. Cornell, treasurer Pratt & Whitney Co.; Henry Fuller, vice-president Fairbanks-Morse & Co.; John H. Lidgerwood, president Lidgerwood Mfg. Co.; A. J. Babcock, president Manning, Maxwell & Moore; Norman Dodge, vice-president Mergenthaler Linotype Co.; H. R. Swartz, president Intertype Corp.; Geo. J. Low, F. M. Dyer & Co.; Chas. A. Hirschberg, publicity manager Ingersoll-Rand Co.

The committee held its first meeting on Sept. 28th, and elected H. R. Swartz, vice-chairman, Geo. J. Low, secretary, and appointed Chas. A. Hirschberg publicity member.

Coal Production Short of Capacity by 21.9 Per Cent.

Mines reporting causes of lost working time produced 77.9 per cent. of an aggregate full-time capacity of 4,408,000 tons per week. Of the 21.9 per cent. of the full operating time lost, 9.8 per cent. was attributed by the operators to car shortage, 8 to labor troubles, and 3 to mechanical disability at the mines. The relative importance of the several causes limiting production, it will be noted, approximates that for the week of September 1. Lack of demand was serious in Oklahoma alone, where certain mines are still declared unable to operate under the present scale of prices.

United Gas & Electric Subsidiary Dividends.

Subsidiary companies of United Gas and Electric Corporation have declared dividends as follows: Citizens' Gas and Fuel Company of Terre Haute, 1¾ per cent. on preferred, and a dividend of 3 per cent. on common, payable October 1; Conestoga Traction, 1½ per cent. on preferred and 1½ per cent. on common, payable September 29; Edison Electric, of Lancaster, Penn., 2 per cent on capital stock, payable September 29; Lancaster Gas, Light and Fuel, 2 per cent. on capital, payable September 29.

Gas Engineers Wanted for the Army at Once.

A gas and flame regiment for early service abroad is in the course of formation according to a recent letter to E. G. Cowdery, president of the Peoples Gas Light & Coke Co., Chicago, received from Major Atkisson, of the 30th engineers, Washington, D. C. This service offers a real opportunity for a limited number of especially trained men in the gas industry to render invaluable service to their country.

Commissioned personnel is required at once as follows: Six captains, 22 first lieutenants and 12 second lieutenants. All must have the following attributes: Every officer should possess great physical endurance, good muscular development and hardihood sufficient for active service at the front. He must be a man of quick conception, a good memory, clear discernment and of steadfast resolution. He must know how to take care of himself. He must appreciate the importance of, and be ready to perfect himself to the limit of his ability, by study and training, for the command of troops in active service.

The following specialists are needed as officers:

Chemical Engineers—Two captains, two first lieutenants and two second lieutenants.

Gas Engineers—Two captains, two first lieutenants and two second lieutenants.

Mechanical Engineers—Two first lieutenants.

Linguist—Two first lieutenants.

Leaders of Men—Two captains, fourteen first lieutenants and eight second lieutenants.

Arrangements in the Chicago company for perfecting this regiment of commissioned and enlisted men are under the active direction of T. V. Purcell.

Lindsay Light To Pay 17 Per Cent Extra on Common.

The Lindsay Light Co. has declared the regular quarterly dividend of 1¾ per cent on the preferred stock, the regular quarterly dividend of 3 per cent. and 17 per cent. extra on the common, all payable Nov. 30 to stockholders of record Nov. 1.

Item 25352 in the **Daily Commerce** Reports of September 11th reports that a man in Spain is in the market for pitch for manufacturing tar, also manufactured tar. Correspondence may be in English. References exchanged. For particulars, write the Bureau of Foreign & Domestic Commerce at Washington or Chicago.

The name of the Everett (Wash.) Gas Co. has been changed to the Puget Sound Gas Co. The company has passed out of receivership, and H. M. Byllesby & Co. will continue to operate it.

The Rochester Railway & Light Co., the Canandaigua Gas-Light Co., the Eastern Monroe Electric Light and Gas Co., and the Despatch Heat, Light and Power Co., have been merged.

NEW PRODUCTS

Garage Heaters

Comprehensive Campaign for This Device Outlined by Manufacturer

It would be difficult to plan a more complete and logical selling campaign for gas company use than the one the Scientific Heater Co. has prepared for the use of the new-business departments that handle the Scientific Safety Garage Heater. Every item that the new-business manager and his force could require in conducting a garage heating campaign is furnished in the layout of scientific sales helps. The sales manual for the use of gas company salesmen is full of substantial selling information—ideas that really will carry weight with a prospect. As an example of the helpful nature of this publication, we quote "The Twelve Reasons for Warming a Garage.":

Eliminate Frozen Radiator Hazard.

(1) Chances of springing the radiator, cracking the engine water jacket, or breaking the pump through freezing of the water, are a constant menace in the unheated garage. Should one of these winter accidents occur, the cost for repairs may be anywhere from a few dollars to several hundred dollars. Anti-freeze compounds should be used, but it must be remembered that they may easily evaporate, especially if the engine should overheat.

Save the Engine from Abuse.

(2) When the cylinders and carburetor are frigid, gasoline cannot vaporize. This makes starting difficult. The engine sputters and kicks on half the cylinders. It must be coaxed and raced, and finally at the peril of developing knocks, and after considerable waste of gasoline and electricity, it gets under way.

Reduce Carbon in the Cylinders.

(3) In starting a cold engine, a rich mixture of gasoline and air must be resorted to for the first five minutes. This tends to increase carbon deposits.

Save the Bearings.

(4) Oil tends to be thick and sluggish in a frigid garage. This imperils the bearings, for they may score before the bearings become warmed by the friction. The tendency to knocking when starting a cold engine still further increases the damage to bearings.

Reduce Battery Deterioration.

(5) A storage battery is a chemical machine. Chemicals act very slow when cold. This makes it impossible for the battery to take full charge. The additional load thrown onto the battery in starting the cold engine soon discharges the battery beyond the danger point. What is technically known as "over discharge" occurs, and over discharge according to all authorities, is responsible for 80 per cent. of all battery ailments. The chemicals disintegrate and fall off the grids. The battery immediately becomes sick and if this condition continues, as it must in a cold garage, the battery is ruined beyond repair. A new battery costs much more than a good garage heater.

Preserve the Finish of the Car.

(6) If housed in an unwarmed garage continuously, moisture gradually accumulates under the varnish and freezes. This causes checking and loss of lustre. In a warm, dry garage this moisture is driven out, thus preserving the upholstery and finish of the car. It costs $50.00 to $75.00 to refinish a car, so that here again a garage heater reduces expense.

Cut Out Winter Tire Destruction.

(7) Moisture gets into the fabric of tires through cuts. Unless the car is stored in a warm dry garage, once in every twenty-four hours this moisture freezes each night while the car is idle. This loosens the fabric from the tires and the process repeated nightly gradually ruins the tires. How much will a set of tires cost you? A garage heater is certain to save at least one-fourth of this amount each winter season in tire expense alone.

Make Winter Wash-ups Easy.

(8) In an unwarmed garage mud and slush freeze to the car. If washing is attempted the water freezes on. It is ruinous to the finish to allow your automobile to remain in this condition. In a warmed garage the mud, slush, and snow melt off while you sleep. When you drive out in the morning the car is comparatively clean.

Winter Adjustments Important.

(9) The careless motorist who does not provide warmth in his garage finds it impossible to make such adjustments as oiling, fresh water in batteries, etc., in his frigid garage. Cold, numb fingers and icy feet would discourage anyone. The necessary attentions to the car are postponed, and what happens? What always happens as a result of neglect? An unpleasant, large repair bill.

Double the Value of Your Garage.

(10) The installation of a garage heater doubles the actual utility value of your garage. That sounds far-fetched, but let us prove it to you. Your garage protects your car only against snow, rain, wind and theft. A lock switch and a tarpaulin thrown over it would do as uch. But add a garage heater, and you protect your car against the much greater ravages of moisture and frost. A garage heater, then while it costs only a fraction of what a garage costs, reallv does much more.

Health Insurance and Comfort.

(11) A cold damp garage is no place to work or tinker. Many a man through sickness has lost many times what a heater would have cost. His life might even be the price he may have to pay. Contrast the above with the warm, comfortable garage which alone is well worth the price of a safety heater. Then one can sit down in warm seats, cover with warm robes,

Newspaper Ads in Garage Heater Campaign.

press the starter button and enjoy a brisk, crisp winter's drive to the office or social function.

Twelfth Reason Not Cited Directly.

(12) The twelfth reason is not given outright, but the salesman is told that it is contained in the manual and the first salesman from each gas company who sends it to the Scientific Heater Co. will be given a seal leather loose-leaf memorandum book.

The rest of the sales manual is devoted to the questions that a prospect would put to the gas company salesman and the answers that the salesman should make in getting the prospective customer to "the dotted line."

"Scientific Sales Methods" is an elaborate book for the new business manager, in which the whole course of the garage heating proposition is presented. The following chapter headings outline the comprehensive nature of the book: The Garage Heating Field, Advantages in Standardizing the Scientific, Advantages of Selling and Placing Early Orders for Garage Heaters, Co-operation With Your Salesmen, The Gas Co. Sales Campaign on Scientific Garage Heaters, Local Advertising. Numerous suggestions for form letters, window trims and newspaper advertisements are given. Some of the newspaper publicity is reproduced herewith. The whole campaign forms one of the most ambitious educational efforts of a gas appliance manufacturer who wants to give the gas company the information it needs to push the product. The new business manager or appliance salesman who wants this informing literature may have it upon request from the Scientific Heater Co., Cleveland, O.

EASY PIPE PUSHER.

Public Utilities Responsive to Announcement of This Unique Machine.

That gas company managers and superintendents are responsive to announcements of new and improved equipment and apparatus is distinctly proved in the case of the "Easy" pipe pusher, manufactured by the Easy Mfg. Co., of David City, Neb., and announced to the gas industry through The Gas Record. This unique and highly efficient machine is enjoying a wide popularity all over the United States, a fact shown in the flood of commendatory letters the Easy Mfg Co. is constantly receiving from gas companies and other public utilities using the pipe pusher.

As every official knows, the three big problems of the public service corporation are service, cost, labor. The manufacturers of the pipe pusher say service means that the citizens and customers be pleased. "The Easy pipe pusher will put in service connections without ripping up paving, or ruining lawns and property. Citizens like this service. The pusher will put an ordinary service pipe from a basement across a paved street to the main at a total labor and pavement repair cost of about $10. Compare this cost to the present one," they observe.

"The Easy pipe pusher will enable two men to install more service work in one day than 20 men could do by ripping up paving, ditching and replacing the paving. This means you can handle five to ten times your present service work with your present help. Pipe pushed in with the Easy pipe pusher will last longer than that laid in a ditch with the dirt tamped in around it. The rust and electrolysis do not affect it as such. Facts can be given on this."

Schoenfeld Goes Into Industrial Appliance Business.

G. J. Schoenfeld, well known in the industrial gas field through his work with the U. G. I. Co. at Philadelphia, has gone into business for himself. His line is second hand industrial gas appliances. Mr. Schoenfeld's experience in the industrial business is good assurance that the appliances his company handles are suitable for the purposes for which they are sold. Mr. Schoenfeld states the nature of the business that his company, the Service Equipment Co., will do: "We want to create a market in the industrial gas appliance business for good second hand equipment which are standing idle for one reason or another—because the line of work has been discontinued or some other reason has superseded the old method, which does not react against the value of the appliance. This field is untouched by gas men and we see nothing unethical in the industrial gas man placing his customer in direct communication with us, in order that he may obtain the appliance for immediate delivery instead of waiting possibly four or six months. If we do not have any equipment desired, in stock, we do our best to locate it for the inquirer."

The headquarters of the Service Equipment Co. are in the Bourse Bldg., Philadelphia.

Second Hand Gas Equipment Exchange Formed.

The Gas Equipment Exchange has been formed in Chicago to act as agents for the purchase and sale of used gas plant equipment. The demand for serviceable used equipment in the gas field is brisk and the Gas Equipment Exchange has listed considerable equipment that is wanted as well as arranged for the sales of equipment no longer in use around plants. The postal address which the company advertises is Box 233, Chicago.

"Gaspruf" Tubing To Have New Addition to Line.

The Atlantic Tubing Co., of Providence, R. I., whose "Gaspruf" tubing is meeting with such universal success, announces a new "Gaspruf" gasoline hose for gasoline pumps. This article, which they are just commencing to place on the market, will fill a much desired want, giving free flow, absolute durability and being steel interior and water proof outside.

"One of the objections heretofore made to steel tubing is that it was so easy to break and bend, thus causing easy leaks," says the manufacturer. "We are now about to make a new tubing, which will overcome these objections, which will be composed of steel, packed and covered with one dip of compound, the whole covered with a cotton covering, which will be pleasant to handle and absolutely safe. One of the characteristics of this tubing will be that it will be waterproof."

Young Bros. Co., Detroit, Appoints New York Agents.

The Bradford-Ackerman Corporation, Forty-second Street Building, New York city, has been appointed the Eastern sales office for the Young Brothers' Co., of Detroit, Mich. The sale of Young ovens for japanning and drying purposes will in the future be handled by this Eastern office for the New England states, New York, New Jersey, Maryland, Delaware and Eastern Pennsylvania. An engineering department, it is announced, will likewise be available for manufacturers in the east who are interested in quick drying and baking processes, and special oven designs will be offered to meet various requirements. The Young Brothers Co. has installed many large electric and gas heated ovens in the middle west, and its successes in that district suggested the opening of an eastern office for the convenience of the eastern trade.

Street Scene Showing Use of Easy Pipe Pusher Under Pavement.

. 2600 Welsbach Inverted Porch Lamp.

he Welsbach porch lamp has just n placed on the market. It is ef- ent, small, attractive and low-priced, olutely wind proof but not water- of. It is for use on porches and i-exposed places; equipped with fil- pilot body bypasses and a "C-C"

Welsbach Porch Light.

ter. "The Pilot That Will Not w Out;" gives as much light as y types of larger lamps, but uses one No. 33 size Reflex mantle. s finished in brown enamel top, other metal parts in statuary ize to match.

GAS FOR POWER.

uce-Macbeth Engines Offer Logical Field for Increased Gas Sales.

he Bruce-Macbeth Engine Co., has ed bulletin 156 featuring its line of tiple cylinder gas engines. It is ted out that internal combustion nes frequently show a saving of 1 50 to 75 per cent. over the ordin- private steam plant or public elec- service. A fuel consumption of cubic feet of natural gas or 15 cub- eet of illuminating gas per horse er hour actually delivered at full is assured. Typical installations hese engines direct connected to tric generators in modern office dings are shown.

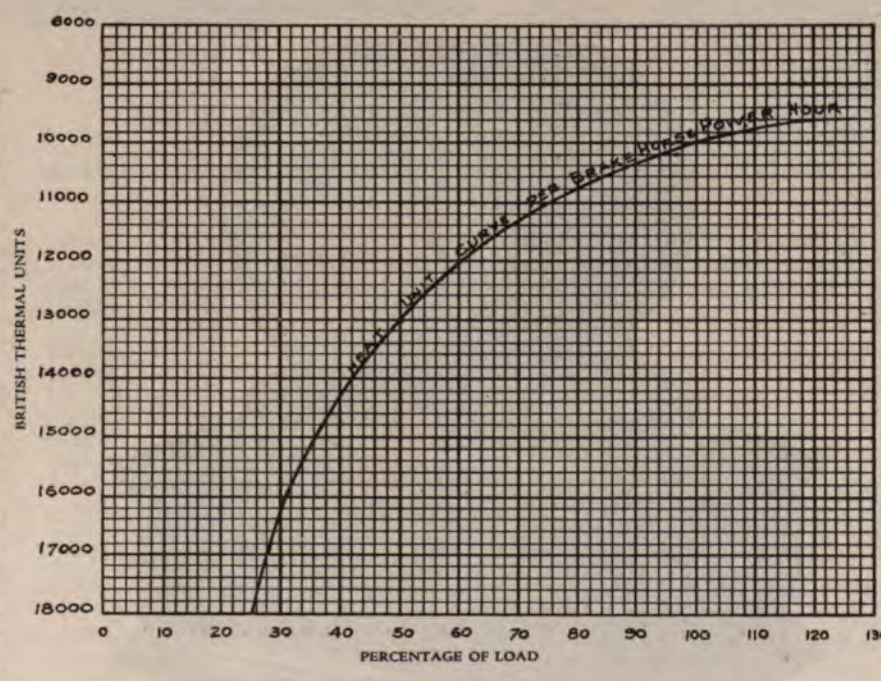
e accompanying economy curve of e-Macbeth engines taken from this tin shows the exact number of units required per brake horse er hour at various percentages of . This is horse power actually de- ed by the engine, not indicated e power. Knowing the heat units cubic foot of the gas available, the c feet required can be easily de- ined. Thus, a 100 h. p. engine at per cent. load requires 10,000 B. t. er h. p. hour, or a total of 1,000,000 . u. Dividing this by 1,000 B. t. u., heat value per cubic foot of natural shows a gas consumption of 1,000 c feet per hour.

copy of bulletin 156 may be ob- ed from the Bruce-Macbeth Engine 2111 Center St., N. W., Cleveland.

Sil-O-Cel For Insulating Heater Tanks.

Sil-o-cel is a white powder weighing about 8 lb. per cubic foot. It is found in a natural rock form in exceptionally pure deposit on the Pacific Coast. By a special process the powder form is produced. Sil-o-cel has an insulating value equal to cork, and ten or twelve times that of fire brick. Being almost pure silica its melting point is about 1,610 deg. C. (2,930 deg. F) which is a great advantage over cork and most other insulating materials. Sil-o-cel is inert—it does not contain organic matter—it will, therefore, keep in good condition for all time, says the Journal of Power, Electricity and Gas. It is fire proof and germ proof, and lower in cost than most other insulating materials. Tests show that by surrounding a 30-gallon household boiler with a frame of ordinary tongue-and-groove wood, allowing a 3-inch space between the outer shell of the boiler and the inner shell of the tongue-and-groove holder filled with Sil-o-cel powder completely covering the boiler excepting the bottom, it will take several times as much heat energy to keep the water in the boiler hot with an ordinary galvanized uninsulated boiler as with the same boiler insulated with a covering of three inches of Sil-o-cel powder, as above described. It has been found that the total cost of insulating an ordinary household boiler with Sil-o-cel powder three inches in thickness including the cost of Sil-o-cel, lumber, labor and all incidentals, will be about $6.00.

Installation of Welsbach Porch Light.



NATURAL GAS one cubic foot=1000 B. T. U.
ILLUMINATING GAS one cubic foot=650 B. T. U.
ANTHRACITE COAL one pound=10,000 B. T. U. in Gas

Heat Unit Curve Showing Fuel Consumption of Gas Engines at Various Loads.

A Sales Help

Device Showing at a Glance Exact Cost of Gas Consumed in Appliance

A piece of apparatus which should be extremely valuable in every gas company salesroom has recently been developed and now being used by many companies. This equipment is known as the hourly cost or rate meter. This device indicates at a glance without timing not merely the hourly rate of gas consumption but the actual cost of operation in cents per hour. By its use an appliance can be effectively demonstrated to a prospective customer on the display floor showing him the exact cost of the gas being consumed.

The device is in combination with a dry meter. The gas first passes through an extremely sensitive dry governor set in the meter head and is delivered to the cost indicator at an absolutely uniform pressure. Passing into the indicator chamber it enters a valve, the stem of which is supported by a very sensitive diaphragm. As the gas passes under this diaphragm the latter is raised or lowered by variations in the pressure caused by closing or opening the outlet, the valve stem rising under increased pressure and partly cutting off the supply when the outlet is slightly closed, and falling and admitting more gas as the pressure drops when the outlet is opened. The volume of gas passing through, therefore, directly affects the diaphragm and valve stem, causing a vertical motion which is communicated by proper gearing to a drum rotating horizontally and having a scale attached to its periphery, showing through an aperture in the dial.

The scale may be calibrated, if desired, to indicate cubic feet per hour in conjunction with a set pointer, or, as will be generally preferred, it will read in cents and tenths of cents, giving with precision the value or cost per hour of the gas being consumed. The cost per hour will vary according to the price at which the gas is sold but this can be readily adjusted by changing a rate wheel, or gear, with varying number of teeth, as is done in prepayment meters, the price of gas being shown on the dial.

This equipment has been developed by the American Meter Co., of New York, which also has mounted the cost indicating mechanism separately from the meter so that it can be used to indicate the hourly cost without using a meter to register the total amount of gas passed. In many cases this part of the apparatus is all that is necessary.

Cost Meter of American Meter Co.

New Hot Plate and Laundry Stove of Wm. M. Crane Co.

The illustrations herewith are those of the new "Vulcan" hot plate. The top consists of ten V shaped bars running parallel. These bars act as flues,

Crane Hot Plate.

preventing the smothering of the flames when the entire top is covered. Small utensils can be moved about freely without tipping. The burners are regular star shaped range burners

Crane Laundry Stove.

mounted on a removable rod. It is made in three sizes: No. 61, 1 giant burner; No. 62, 1 giant and 1 regular burner; No. 63, 1 giant and 2 regular burners.

This appliance can also be converted into a high laundry stove by mounting the top on 22¼ inch legs, as shown in the illustration. It is made in two sizes: No. 1062, 2 giant burners; and No. 1063, 3 giant burners.

The construction of these appliances is heavy and durable.

New "Radiantfires" Announced by General Gas Light Co.

The General Gas Light Co. announces a new companion piece for its handsome and popular "Radiantfire" heater. It is the No. 20 Fire, built of stamped steel, finished in black, and using seven instead of ten radiants. There are also other additions to this now famous line—the Rustic Fires, No. 40 and No. 41. These also have seven radiants, are made of cast iron and finished in verde green. The burner construction in these new fires is identically the same as that of the larger "Radiantfire," the only difference being in the seven instead of ten radiants.

RUST-PROOF PROCESS.

Parker Rust-Proof Co. Treats Iron and Steel To Add Increased Life.

The Parker Rust-Proof Co. of America is now about two years old. It started in a small way and rapidly rose to be a $100,000 corporation, which was subsequently increased to $2,300,000. Today the plant covers an area of four acres.

The effect of the Parker process is essentially a chemical one. The operation consists in taking metal, iron or steel, thoroughly cleaning it by sand blast, pickle, or in some cases, a soda bath. After this the cleaned metal is immersed in a chemical solution where it remains a predetermined length of time, depending upon the nature of the metal and just what effect is to be obtained. There is a lively effervescence when the metal is first let into the solution and this gradually diminishes until everything becomes quiet. At this juncture the processing proper is over. After the metal has been removed from the solution, it is oiled with a special oil. The oil fixes the effect of the immersion and gives it a black mat finish. On articles that are to be painted, the oil is not put on, but the metal is left just as it comes from the chemical bath.

All forms of iron or steel can be processed. For instance, they are processing the finest kind of dental needles in one tank and in the same tank process large structural steel pieces, many parts more than 20 ft. long. Machined parts, castings, pressings and forgings are all handled in a similar way and the effect of the process is likewise similar in all cases.

The natural finish resulting from the process is a steel gray which, when oiled, becomes a beautiful soft mat black. The surface of the Parker processed metal is exceptionally well adapted for enameling since there is a very fine microscopic etching which helps to bind the enamel. If at any time the enamel should crack and expose a part of the rust-proofed steel, there would be no rusting set in and consequently no peeling off of the enamel as is the case today in all enamelware. The predominant advantage of the Parker process is in increasing the longevity of iron and steel since once they are processed such metals are absolutely and positively immune to corrosion due to atmospheric attack. Another big economical feature of rust-proofing is the substitution of Parker processed iron and steel for copper, brass and aluminum. The third big advantage is that the rust-proofed article has its selling power increased to a limit which no one as yet has been able to estimate. Ranges, radiators, hardware, ornamental iron work, iron fences—in fact, everything which comes into ordinary use of life and which is made of iron and steel, can be made commercially 100 per cent. more valuable if rust-proofed than if not. This is a very conservative estimate, the company believes.

Where manufacturers prefer to do the processing in their own plants, the company licenses the process to them. Under this arangement there are now working some 67 different firms.

Interior of Main Preserving Room Parker Rust-Proof Co., Detroit.

KEEP AUTOS WARM.

A Gas Garage Heater the Automobilist's Warmest Friend in Winter.

Too much care cannot be given the detail of construction of a gas garage heater. It must first be safe; second, fool proof; third, durable and, fourth, efficient. All these qualities, in order named, were carefully considered, says the manufacturer, when building the High Efficiency Safety Gas Garage Heater manufactured and sold by the Gas Appliance Co., of Cleveland, O.

It combines practically every safety feature incorporated in other makes and several additional and fool proof ones, they claim. Garage heaters are designed similarly to the "Miners Safety Lamp." Both primary and secondary air enters through a brass screen cloth situated under and safely housed beneath burner.

This has a mesh so fine that while air and vapor may be drawn through it, a flame will not pass through it to ignite gasoline that may be spilled or thrown on the floor directly under heater when in operation.

There is a valve on the supply line which when closed prevents lighting either or both pilot and burner, a valve on the burner and a pilot control, through which pilot flame may be raised or lowered, but not entirely extinguished, except through closing main line valve. A drop door is provided which closes with its own weight when released, preventing the possibility of door being left open through carelessness. The door is recessed at point fitting into frame and packed with asbestos to fit snugly.

A very small sight hole is placed in door and this covered with perforated brass (not mica) so operator may see flame inside. Door is provided with

Safety Garage Heater.

trip catch to fasten when dropped into place and provision made on door and frame so padlock may be used and door locked shut if desired. Air mixer is on inside of heater, so, if by any chance, gas flame flashed back in mixer, there is no danger of igniting gasoline on floor. Burner is of cast iron with raised ports. Interior of heater of heavy sheet steel. Radiating surface large, about 4,172 sq. in. Fire travel entirely upward, insuring safety when lighting even though garage and heater is cold. This is an important feature in gas garage heaters.

The High Efficiency Safety Gas Garage Heater is made in but one size, the No. 11, and designed to heat any usual one car garage containing not more than 3,600 cubic feet of contents to 50° F. in zero weather. Garages are frequently subject to down drafts. To prevent flame blowing or smothering out during such times an automatic draft regulator is provided with each heater.

Manufacturers furnish attractive circulars to inquirers and offer to provide a definite plan for campaigning them upon request.

Builders Iron Foundry Issues New Circular.

The Builders Iron Foundry, 9 Codding St., Providence, R. I., has issued circular No. 2 featuring the products which it and its associated companies manufacture. Among the things listed are the following: Floor grinding and polishing machinery, wet tool grinding machines, disc and emery ring grinding machines, surface grinding machines, face grinding machines, safety "pull" countershafts, Venturi meters, rate of flow controllers, chemical feed controllers, loss of head gauges, water level recorders, special instruments, globe special water pipe castings, gas furnaces (for the heat treatment of metals), contract foundry work and special heavy castings.

ABOUT MEN YOU KNOW

Geo. W. Allen Recovering From Recent Illness.

Geo. W. Allen, the genial secretary of the Canadian gas association, who has been seriously ill for nearly three months, is at last well on the way to recovery. This is good news to the members of all the American gas associations. Mr. Allen expects to return to his desk soon.

Stewart Swift, new business manager of the Rochester (Minn.) Light, Heat & Power Co., has resigned to join the colors.

Gas Maker Leigh Davis, of the Worcester County Gas Co., of Palmer, Mass., has resigned to enlist in the Medical Corps, and is now stationed at Fort Slocomb, N. Y.

G. W. Boteler has assumed the duties of manager of the Waukesha (Wis.) Gas & Electric Co., succeeding H. B. Atkin, who has gone to the Philadelphia Suburban Gas & Electric Co., at Phoenixville, Pa.

R. P. McConnell, formerly manager for the St. Clair County Gas & Electric Co. at Belleville, Ill., now is promoting new business in the electrical department of the Waukesha (Wis.) Gas & Electric Co. and the Citizens' Gas & Electric Co., of Waterloo, Ia., between which he divides his time.

R. C. Peabody, well known as president of the Combustion Engineering Corp., died on September 15.

L. H. Johnson, formerly superintendent of works for the Sheboygan (Wis.) Gas Light Co., now is at the Plattsburg (N. Y.) training camp.

T. M. Flanagan, the industrial engineer of W. L. Powers' staff, is making a tour of eastern gas properties and inspecting representative gas-equipped manufacturing institutions.

C. N. Wagenseller of the H. Mueller advertising department has a fine record of national service with three sons in military service. One is a lieutenant in the National Army, one is a private and another is a signal man in the navy.

James M. H. Young, the newly elected president of the Canadian Gas Association, first entered the gas business at Allegheny, Pa., in 1893. He was appointed manager of the Southside Gas Company, at Pittsburgh, Pa.,

Jas. M. H. Young.

in 1896. He left Pittsburgh to accept the management of the Joplin, Mo., Gas Co., 1900, and took charge as superintendent of the City Gas Co., of London, Ontario, Canada, in 1907, a position he has held ever since. He has been a member of the Canadian Gas Association since its formation, and has been an officer and member of the executive committee of that association for a member of years.

J. R. Ellis Takes Charge at Waxahachie, Tex.

J. R. Ellis, one of the lucky American men who escaped with a whole skin from bandit-ridden Mexico, where he formerly ran the Guadalajara gas works, has resigned from the Iowa Railway & Light Co., of Marshalltown, Ia., to accept a position with Henry M. Wallace's Detroit syndicate Mr. Ellis will not be far from his former scene of activities at Dallas, Tex., as he becomes superintendent of the Waxahachie (Tex.) Gas Co. for Mr. Wallace.

The Grand Rapids (Mich.) Gas Light Co. has appointed S. W. Cheney, formerly with the American Public Utilities Co., as its engineer. He has charge of construction and later will take charge of operation.

Jos. Guffey Appointed Government Oil Supervisor.

Joseph F. Guffey, president of the Natural Gas Association of America, and a Pennsylvania oil producer, has been appointed to the position of supervisor of government oil purchases under the war industries board. He will act as advisor to Bernard Baruch, in charge of raw materials, purchasing for the board, and will co-operate with Dr. H. A. Garfield, fuel administrator. Mr. Guffey was formerly a member of the national defense council's petroleum committee.

J. C. Bowery, district sales manager, Pittsburg Water Heater Co., Washington, D. C., is receiving congratulations on the arrival of a son, John C. Jr., born September 1st .

Bert C. ("Happy") Dore has resigned his postion as assistant superintendent of the Suffolk (Va.) Gas-Electric Co. to enter the employ of the U. S. Government at Newport News, Va.

C. S. Morse, secretary-treasurer of the Portsmouth (Va.) Gas Co., is convalescing after a severe attack of erysipelas.

F. L. Marshall, general manager of the Gas Light Co. of Augusta, Ga., spent several days of last week in Washington, D. C., in connection with details for gas appliances to be installed by his company at the Augusta cantonment.

Frank H. Evans, formerly in charge of the commercial department of the Wisconsin-Minnesota Light & Power Co. at La Crosse, which position he resigned July 1, has accepted a similar position with the Eastern Wisconsin Gas & Electric Co. at Fond du Lac, Wis.

John T. Young, of the Grand Rapids (Mich.) Gas Light Co., has been in Washington with Victor F. Dewey, of the Detroit Gas Co., and Bert Larraway, of the Jackson Co., as a committee representing the Michigan Gas Association to lay before Commissioner Garfield the conditions and needs of the gas companies in Michigan in the matter of coal supplies.

troit City Gas Men Go Into Military Service.

he Detroit City Gas Co. has fur-ed its full quota of men to the tary service. John J. Groff, for ral years chief clerk of the new ness department, has reported to national army cantonment at Bat-Creek. Lubin Lamborn and John ne, of the range department, are to rt at Battle Creek early in Octo-Richard Fowler, commercial ager, has been commissioned cap-in the Michigan state troops, or-ized militia which takes the place the federalized national guard. ald Burgess, formerly in the ertising department, has enlisted the United States engineers and

John T. Naylon.

reported at Columbus. Oliver McVicar, who left with the Michi-naval militia last May, has been moted to quartermaster on the U. S. "Kansas." Frank W. Tufts, man-r of advertising, is a non-commis-ed officer in Co. "A" of the 50th iment, Michigan state troops but received his call for the national y and will probably leave early in ober for Battle Creek. Wm. T. re, of the advertising department, sergeant of one of the companies he Michigan state troops. A letter n Don Paradis, who enlisted in U. S. marines, has come in. He has been promoted to sergeant and leaves for France in a short time. Don was one of the good service department men.

John T. Naylon, formerly industrial salesman for the Detroit City Gas Co., after completing a course at Fort Sheridan, was commissioned second lieutenant in the ordnance department and is now in Washington. Mr. Naylon while at the University of Michigan was awarded the Michigan Gas Association fellowship under Professor White. Professor White at the beginning of the war was commissioned a major in the ordnance department As a curious coincidence Major White asked the war department to assign him two second lieutenants as assistants. When he was given a list of lieutenants to select from he was surprised to find Lieutenant Naylon's name among them, so he immediately asked the war department to assign Mr. Naylon to his staff. This was done and Lt. Naylon is now serving the government under his old college professor.

Death of Dugald Porter, at Moline, Ill.

Dugald G. Porter, assistant general manager of the Peoples Power Co., of Rock Island and Moline (Ill.), and son of Joseph F. Porter, former president of the Tri-City Railway & Light Co., died Sept. 1st at his home in Moline. He had been ill for ten days with a slight attack of typhoid fever. He was one of the ablest young men in the gas industry, being only 26 years of age.

"The Tri-City companies have lost one of their most valuable men and the sympathy of every employe is extended to his relatives," said an official of the company recently. He was to have remained with the companies after his father's resignation and was slated for a good promotion in the reorganization. His father resigned to become president of the Kansas City Railway & Light Co.

Harry L. Strange, formerly manager of the Honolulu (Hawaii) Gas Co. and now a captain in the Royal Engineers of the British army, recently was injured in a shell explosion and has been in the hospital in France for several weeks.

J. J. Humphreys, the gas engineer, who until recently was located at St. Catherines, Ont., now is captain in the ordnance department at Washington.

William Jones, for the past fifteen years connected with the Wisconsin Traction, Light, Heat & Power Co. at Appleton, Wis., and for the last ten and one-half years superintendent of the gas department, has tendered his resignation, effective September 30th. Mr. Jones is to be superintendent of manufacture for the Michigan Light Co. at Bay City, Mich.

William Byron Keffer, assistant secretary and treasurer of the Des Moines (Ia.) Gas Co., secretary of the Iowa District Gas Association and a prominent member of the National Commercial Gas Association, died suddenly September 14th. He was connected with the Des Moines company for nearly thirty years and was active in civic affairs and public improvements for his city. He was a Mason and a member of the Order of Red Men.

Oliver J. McVicar.

G. H. Waring, vice president and general manager of the Charleston (S. C.) Consolidated Railway and Lighting Co., has resigned to accept the office of manager for the American Public Utilities Co. at Salt Lake City, Utah. C. M. Benedict, assistant secretary and treasurer, has been placed in charge of the operations of all departments of the company and made vice president. The title of general manager has been abolished. Miss C. C. Tessier has been made assistant secretary and treasurer.

GAS LITERATURE AT A GLANCE

Conducted by R. S. McBride and C. E. Reinicker, Bureau of Standards, Washington, D. C.

A Singular Fatality in Benzol Recovery.

"Gas World", 67, 19-20 (Coking Section) (Aug. 4.).—According to the testimony presented at the coroner's inquest the deceased, before being overcome, had been skumming oil from a catch box from the benzol washer. He was found lying on a board, his body partly immersed by the contents of the box. No fumes were said to be discernible in the locality. The man was revived by artificial respiration and progressed favorably for a time after which he developed bronchial pneumonia and died. The catch box contents when analyzed the day following the accident was ascertained to be a very dilute solution 0.75 per cent, sulphuric acid with a small amount of benzol floating on it. The body and right shoulder of the deceased had the appearance of having been scalded, for which no satisfactory explanation was given.—D.

Coal Gas for Motor Traction.

By "British Commercial Gas Assoc.", "Gas World", 67, 92 (Aug. 11), "Gas Journal", 139, 233 (Aug. 7).—The executive committee of the association in a supplement to the "Bulletin" states that the only great difficulty in the use of gas for automobiles is the bulk of the gas. Flexible holders while very fragile are easily recharged and deserve attention as a war measure. When gas is stored in steel cylinders under pressure 20 to 25 atmospheres is the maximum recommended. Stored at this pressure the loss in heating value is not over three per cent. The committee's investigations go to show that one gallon of petrol delivers about as much work as 300 cubic feet of gas, depending upon the quality of gas and petrol. Concerning the weight of steel cylinders it was stated that per 1,000 cubic feet of gas the cylinder weight ran from 1,455 to 1,900 lbs. It is estimated that this weight may be reduced 50 per cent. or more by the use of steel of higher tensile strength. In equipping charging stations it was recommended that the station units be of the multiple type for economical as well as mechanical reasons. A station storage tank at higher pressure than required by cars was recommended unless the demand for gas was so large as to warrant the installation of a compressor large enough to charge the car storage tanks in five minutes.—D.

Preventing Boiler Scale.

Preventing scale in steam boilers: When boiler is cleaned, put approximately one pound of coffee-grounds to each 100 horse-power rated capacity into the drums and allow it to remain there while the boiler is in operation. Fresh coffee may be used in the event coffee-grounds are not available, but if substituted for the grounds, do not put boiler on the line until after it has quit foaming.

Centrifugal Washers for Coke Oven Benzol Recovery.

"Gas World", 67, Coking Section 17-19. (Aug. 4).—Some coke-oven men have recently expressed a preference for centrifugal washers as compared with tower scrubbers for oil washing gas. A type of centrifugal washer is described in this article which is said to give very satisfactory results. In the case mentioned the principal data are as follows: Gas washed, 1.75 million cu. ft.; capacity of washer five million cu. ft. per day; temperature of gas and oil 20°C; oil used, tar creosote; benzol content of gas ahead of washer 2.8 gallons, after washer, .05 gallon per ton of coal carbonized; yield of benzol 2.75 gallons per ton; extraction of benzol 98.2 per cent. The machine consists of a vertical cylindrical cast iron vessel divided into a number of chambers and traversed by a shaft to which are attached devices for lifting and spraying the washing liquid and so effecting intimate contact of gas with wash oil. The number of chambers varies from two to ten. The sprayer originally consisted of specially designed trays with perforated rims and dependent bent tubes, also perforated, arranged to revolve at from 100 to 150 r. p. m. When in use the oil is forced up the bent tubes, through the perforations, and, also into the trays and through the perforated rims, crossing the gas space and being thrown against the wall. In the latest type of machine the sprays are supplemented by a number of fans having serrated edges for the purpose of assisting in the process.—D.

Manufacture of Nitrate of Ammonia by Electric Power at Coke Oven Plants.

By E. Kilburn Scott, "Gas Journal," 139, 235-6 (Aug. 7); "Gas World," 67, (Coking Section) 10-12 (Aug. 4).—The writer in the course of his communication, suggested that instead of the ammonia of coke ovens being made into sulphate, it should be turned into nitrate of ammonia, which is a more valuable product per unit of combined nitrogen—the dilute acid required for the purpose to be made from the nitrogen of the air in arc flame furnaces, with energy generated by the surplus gas or waste heat of the coke ovens. The equipment required and the process of operation are described and an estimate of the cost of operation is given.—D.

Urgent Need of More Tar.

"Gas Journal" 139, 225 (Aug. 7).—The minister of munitions (British) has appealed to gas engineers to realize the maximum coal gas output and to shut down their water gas plants at once, except for supplying output demands in excess of coal gas manufacturing capacity. The ministry requires the maximum production of tar of as good quality as possible.—D.

Thermal Decomposition of Benzene.

By J. E. Zanetti and G. Egloff, "Journal of Industrial and Engineering Chemistry," via "Gas World" 67, 52 (July 21). —The authors report a study of the thermal decomposition of benzene at temperatures varying from 500° to 800° at atmospheric pressure, the effect of varying the rate of flow of benzene and the presence of catalysts being examined. The chief products of decomposition are diphemyl, dephenyl benzenes, carbon, and a gas; no naphthalene being found in the decomposition products. The gas consists of hydrogen saturated with benzene vapor, no acetylene being found. The catalysts examined were copper, iron, and nickel in the form of gauze. Iron and nickel favor the decomposition to carbon and hydrogen. Copper exerts no influence except above 750° when it accelerates the formation of carbon. The thermal decomposition of benzene at atmospheric pressure takes place with the formation of condensation products in which the benzene ring apparently remains intact, or with the complete breaking down to carbon and hydrogen without the formation of appreciable quantities of intermediate products.—D.

A Quick Test for Benzol in Gas.

By T. F. E. Rhead, "Gas World," 67, 39 (July 21).—An oil washer constructed of sheet iron is used. It works on the continuous counter current principle and is very similar in action to a fractionating column. A prepared wash oil is fed in from a constant head tank and the gas passes up, meeting the oil in successive trays. The gas bubbles through a ¼-in. seal in each compartment, and, with an initial pressure of six to seven inches of water, the washer will scrub 20 cubic feet of gas per hour, leaving no appreciable washable products in the gas. After once starting, if the oil has been carefully freed from grit, the washer requires little attention until the head of the washing period, i. e., four to five hours for 100 cubic feet of gas. At the end of the test the oil is run off on the benzol distilled out of it in the usual manner. About four liters of oil are required to scrub 100 cubic feet of gas. A test can be started and figures for pure benzol and toluol obtained in eight hours, i. e., five hours for washing and three hours for analysis.—D.

Intermittent Vertical Retorts for Medium Sized and Small Gas Plants.

By F. G. Ambler, "Gas Journal" 139, 276-9 (Aug. 14) "Gas World" 67, 130-1 (Aug. 25).—The writer goes into considerable detail in describing the construction of intermittent vertical; including suitable foundations; refractory materials employed; the construction of the settings, including the producers, regenerators, hydraulic mains and take off pipes, etc. The method of operating is also described. Tables are given showing the analyses and yields of the various products.—D.

The GAS RECORD

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Plan for Toluol Recovery

Definite Method for Removing This Product from Gas—Recommends That Government Contract for One Year's Production to Amortize Plants

By Sub-Committee on Coal Tar By-Products

The following statement of the amount obtainable is the result of a questionnaire sent out to about 75 of the largest gas companies. The estimate is based on 1.6 per cent. of the gas oil used in water gas manufacture. We know that this is possible in plants using 3.5 gallons of gas oil, or more, per thousand feet of gas made. Some of the companies, however, are using less than three gallons per thousand, and there has been no plant erected for the recovery of toluol in such plants. We have no reason to doubt that the proportion of toluol recoverable from gas changes for these smaller quantities of gas oil used.

It is estimated that there can be produced 7,314,390 gallons additional of pure toluol per year from the gas companies in the following cities of this country: New York, New York and Richmond, Brooklyn, Chicago, Philadelphia, Boston, Detroit, Jersey City, Newark, Los Angeles, Paterson, Minneapolis, Milwaukee, Providence, New Orleans, Portland (Ore.), Omaha, New Haven, Atlanta, Seattle, Grand Rapids, Lynn, Cambridge, Elizabeth, Denver, Springfield, Atlantic City, Allentown, Worcester, Albany, Richmond, Hartford, Bridgeport, Fall River, Malden, Wilmington, Houston, Utica, Pawtucket, Reading, New Bedford, Troy, Lowell, Buffalo, Waterbury, Lawrence, Birmingham, Binghamton, Manchester, Peoria, East St. Louis, Nashville, Salt Lake City, Portland (Me.), San Antonio, Jacksonville, Charleston, Schenectady, Wilkes Barre, Savannah, Tacoma, Trenton, South Bend, Haverhill, Brockton, Chester, Lansing, Cedar Rapids, Sioux City, Hammond, Peru, Poughkeepsie, Waterloo, Madison, Ardmore, San Francisco and Oakland, Jackson,

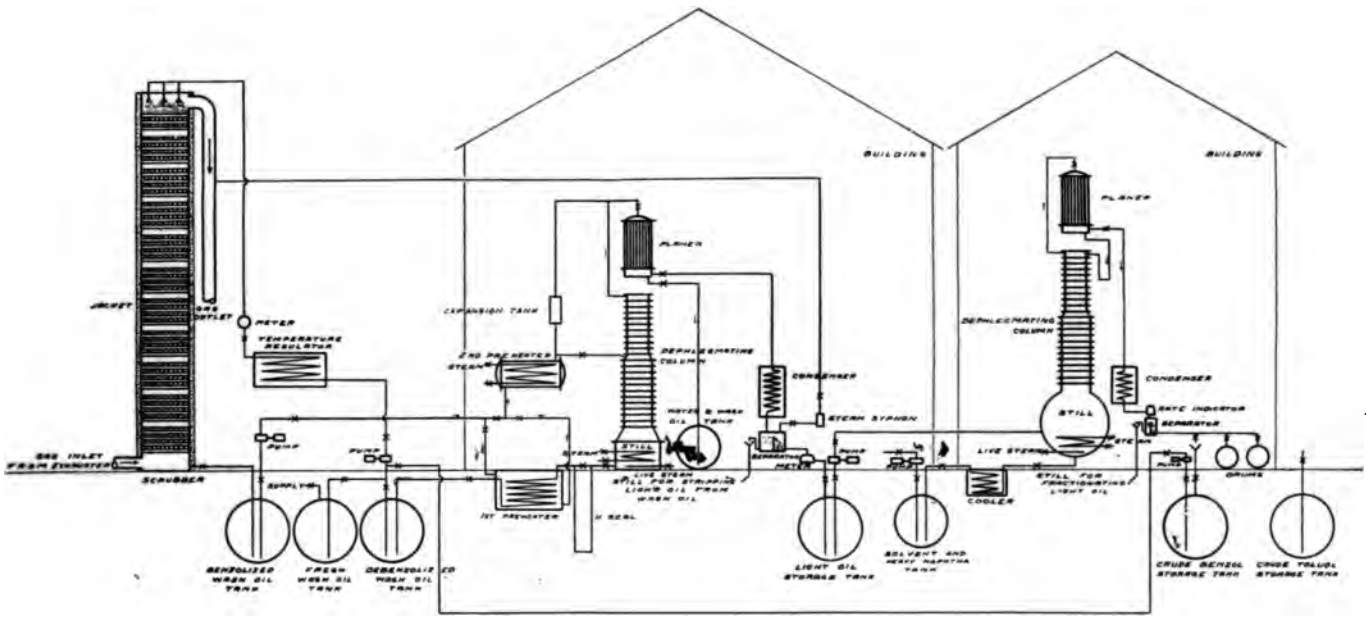

Fig. 1—Plant for Scrubbing Light Oils from Coal or Water Gas and for Fractionating the Oil. For Capacities from 40 to 65 Gallons Light Oil Per Hour.

Pittsfield, Battle Creek and St. Louis. This is estimated on the basis of 1.6 per cent. of gas oil used in water gas manufacture and .03 of a gallon per M. of coal gas.

From the foregoing list of plants, installation for recovery of toluol is now either going in, or a plant is operating at the following points: Chicago, Jersey City, Newark, Paterson, Minneapolis and St. Louis, equivalent to 1,224,000 gallons of the foregoing total, leaving a balance still obtainable of 6,090,390 gallons. Of the remaining plants, the following fifteen plants would give 3,274,000 gallons of toluol, or 45 per cent. of the amount possible from the plants enumerated above—seven New York Consolidated; five Brooklyn Union; Philadelphia; Boston and Detroit.

Cost for Such Equipment.

No definite figures can be given until we can ascertain accurately at what price sheet steel and steel shapes and castings, pumps, etc., can be purchased.

What Plants To Include.

We have not included in the list under "a" any plant that will produce less than 10,000 gallons of pure toluol per year. There are a number of other plants that could produce 5,000 gallons per year, but they could not have recovery plants installed, except at very high cost. Many such plants will be found to be lacking in real estate for the installation, and it is doubtful whether any of the present designs of plants are best adapted. We would, therefore, recommend that we do not consider these plants until the government shows a desire to get more toluol than can be produced by the companies enumerated. If that is the case, we would advise that experiments be carried on at once, in some of these plants to determine whether the efficiency of certain forms of apparatus recommended for smaller plants would be great enough to warrant their installation.

Not included in the companies here enumerated, and excluding also the gas companies supplied with oven gas from which light oil has already been removed, there are some 800 other companies that will manufacture in the aggregate during 1918 about 55,000,000 M. cubic feet of coal gas and water gas in the proportion of 80 per cent. water gas and 20 per cent. coal gas, equivalent to 3,300,000 gallons additional toluol from all companies.

Recovery of Toluol As Contemplated.

Gas works recovering toluol prior to August 1, 1917	1,733,718 gals.
Gas works recovering toluol or erecting recovery plants between August 1 and September 16, 1917	1,224,000 gals.
Gas works as shown above not started on toluol recovery	6,139,000 gals.
Total	9,096,718 gals.

Securing Toluol From Light Oil.

Apparatus for plants making from 40 to 65 gallons of light oil per hour—first stage: The gas carrying the vapors of "light oil" made up of olefines, benzol, toluol, solvent naphtha and heavy naphtha, is brought into contact, in a scrubber located at the inlet to, or outlet from the purifying house, with an oil having absorptive properties for these vapors. These light oils are thus removed from the gas and carried out of the gas train by the benzolized wash oil flowing from the bottom of the scrubber and are collected in a suitable tank called a benzolized wash oil tank.

Note: The wash oils now in use are so-called straw oil, sold through oil refining companies, and oils having a specific gravity of about 1.04 obtained from the distillation of coal tar or water gas tar and sold by the tar distilling companies. They must have the property of not starting to boil below 200°C., at which temperature all of the light oil will have been boiled off. The temperature at which the gas should reach the scrubber is about 85° Fahrenheit, and it is desirable that the scrubber should be jacketed with insulating material and that the wash oil entering the scrubber should be slightly higher than the temperature of the gas. This is to prevent condensation of water in the scrubber, which may cause considerable trouble by emulsifying the benzolized wash oil and which would add difficulty to the operation of separating the light oil from the wash oil in the rectifying column.

Second Stage.

The benzolized wash oil is pumped continuously, first through a heat exchanger where it absorbs the heat from the hot debenzolized oil flowing from the bottom of the still, and then through a steam preheater where it is raised to a temperature of about 120°C., into a rectifying or dephlegmating column made up of sections of bell washers piled one on top of the other,—the hot oil entering about half way up the column. In the bottom of the debenzolizing or stripping still is a chamber into which live steam is admitted to the body of the wash oil. A steam coil also is placed on the bottom of this chamber.

At the top of the column is a water cooled condenser or planer. When the hot benzolized oil is pumped into the column, the lower boiling portions of the light oil are vaporized and pass upward through the column. The wash

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Dr. W. H. Nichols,
Chairman Committee on Chemicals,
Washington, D. C.

Dear Sir:

We present herewith this committee's suggested report on the production of toluol by gas companies.

We call attention to the fact that in the description of processes there has been given a practical method of toluol recovery that has been in successful operation for several years. We do not wish to be understood as saying that it is the best possible in all details. Specialists in the installation of recovery plants will doubtless have their own solution of various details.

If, on statement of the facts and estimates as herein set forth, the government needs the toluol, this committee suggests one way of accomplishing this object to be as follows: that contracts should be made by the government with the respective gas companies for the full production of at least one year, allowing in the price sufficient amount to amortize the cost of such plants. This cost can not now be accurately determined for reasons set forth in the report, and would rest largely upon the action of the government in determining the price for the steel, castings, pipe, etc. Further to facilitate the necessary financing, the government should be willing to advance the money for amortization during the construction period.

Respectfully submitted,
Sub-Committee on Coal Tar By-Products,
(Signed) Wm. Hamlin Childs, Chairman.

Mr. D. W. Jayne, Secretary,
Sub-Committee on Coal Tar By-Products.

My Dear Mr. Jayne:

The report presented by your committee on the difficult subject of gas scrubbing was received by the committee with considerable enthusiasm. The committee unanimously requested me to present to you its thanks for the fine work done and to express to you its appreciation of the large amount of labor and personal sacrifice involved.

Will you kindly transmit the above resolution to Messrs. Gartley, Addicks, Ramsberg and your good self.

Yours very truly,
Committee on Chemicals.
(Signed) J. D. Cameron Bradley, Secy.

oil, carrying the unvaporized light oil, flows downward through the column to the bottom chamber, where it meets with the heat from the steam coil and where live steam is introduced directly into the body of the oil. Under the law of partial pressures, if live steam is admitted to the hot oil at the bottom of the column, the temperature at which the light oil will be driven off is reduced. For instance, the xylol, which is the main constituent of solvent naphtha and which boils at a temperature of 141°C., will, when live steam is admitted, boil at a temperature of 91.5°C. By this means the remainder of the light oil is driven off and upwards through the column. The vapors in their passage up through each of the bell washers will be absorbed by the liquid contained therein. Some of the vapors will become fluid and give up their heat to this body of liquid. This will cause vaporization of the lighter portions of the liquid which will pass on up to the next bell washer, and so on until the top is reached.

The planer at the top will have its temperature set so as to permit the light oil to go forward as a vapor, but will condense any water, wash oil or heavier materials which will flow as a liquid from the planer through a worm condenser, thence to a storage tank. Here it may be collected, the water drawn off and the material pumped again with the benzolized oil from the scrubber to the column; or, after the water is drawn off, if this material should prove too heavy for the column it can be pumped into the light oil, to be sent through the light oil still. This will depend upon the quality of the wash oil.

This is a continuous operation and the efficiency of the wash oil for further absorbing light oil in the gas scrubber will depend upon the degree of separation of the light oil from the wash oil. If the wash oil is sent back to the scrubber without a thorough separation of the light oil, its efficiency for the absorption of the benzol vapors from the gas will be reduced. The efficiency of this separation in the column and planer will depend upon, first, the temperature at which the oil is admitted to the column, which should not be allowed in any event to go below 105°C., and which should preferably be above than below 120°C., and second, on the design of the column and planer. The debenzolized wash oil flows continuously from the bottom of the still and is cooled in the heat exchanger referred to above. It then passes to the debenzolized wash oil storage tank, from where it is pumped again through the scrubbers.

The condensate in the planer, made up of water, light oil and some of the wash oil, is not allowed to flow back into the column, as is usual with rectifying columns of this kind, because of the presence of water which would interfere considerably with the rectifying operation.

Note: In large plants it will be found of value to run a vapor line from the outlet of the worm condenser back to the gas outlet from the scrubber. There will be found sufficient uncondensable olefines existing in a vaporous form to be worth saving. This can be done with a fan or a small steam syphon.

Separating Benzol and Toluol.

The result of this first and second stage is the separation and collection in liquid form of the light oils from the wash oil, and the returning of the debenzolized wash oil to the gas scrubbers. Whether in works sending out less than an average of 750,000 cu. ft. of gas per day it will be best to stop the toluol recovery process at this point and sell the light oil so separated to the benzol and toluol refining companies for refining into pure toluol and pure benzol, or for the gas company to continue to the next stage of separating the crude benzol fraction from the crude toluol fraction, sending only the toluol fraction to be refined, will depend upon:

(1) The need for conserving the candle power by restoring the benzol fraction, and especially the olefines contained therein, to the gas. The first step of the refining operation is to destroy these olefines by sulphonation with sulphuric acid. Water gas will have as much as 15 per cent. of the light oil as olefines, and coal gas as much as 6 per cent. The entire benzol fraction will be about 40 per cent. of the light oil and will have a candle power enriching value of about 20 candles per M. per gallon of benzol fraction.

(2) The need for reserving the refining capacity of the country for pro-

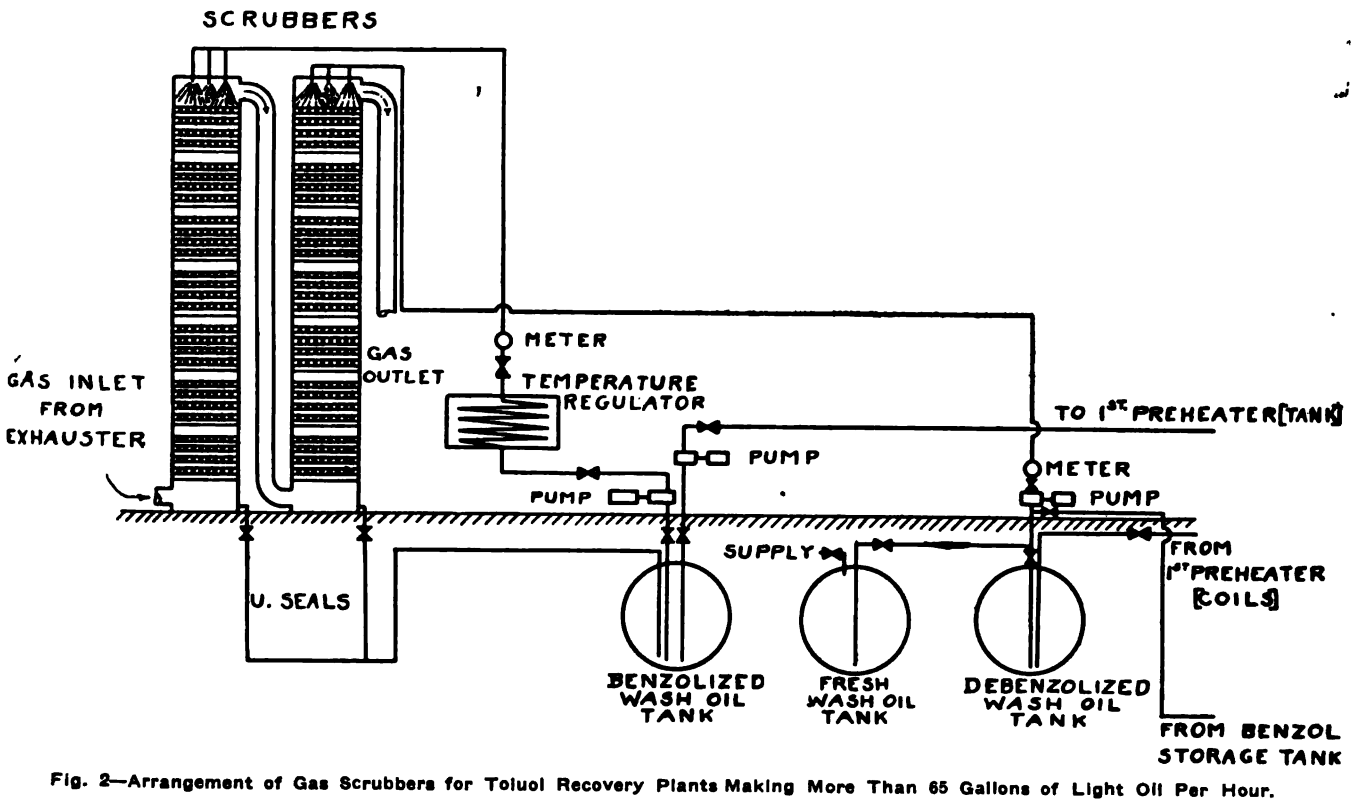


Fig. 2—Arrangement of Gas Scrubbers for Toluol Recovery Plants Making More Than 65 Gallons of Light Oil Per Hour.

duction of pure toluol instead of pure benzol.

(3) The need for minimizing the railroad transportation. If only the crude toluol fraction is shipped, the volume transported will not be over 25 per cent. of that of the light oil.

As against the above:

(4) The toluol remaining in the benzol and naphtha fractions, amounting sometimes to as high as 10 per cent. of the total toluol, will be lost to the pure toluol production.

(5) It may be found eventually that a great increase in the quantity of pure benzol produced will be needed if the total production of pure toluol proves insufficient.

(6) The reduced cost and time and area required for installation of plant.

Third Stage.

The third stage is the separation of the light oil into the benzol fraction, the toluol fraction, and the solvent and heavy naphtha fractions. This consists of a still on which a dephlegmating column is superimposed, and above the column is a water cooled planer or condenser. The still is again heated by steam contained in steam coils, and also steam is admitted directly into the body of the oil. This is an intermittent operation. After the still is filled, the indirect steam is turned on and the temperature at the vapor outlet of the planer at the top of the column is carried so that the benzol fraction is boiled from the light oil and passes out as a vapor from the planer. The temperature of the planer is then allowed to increase and the toluol fraction is driven off, during the latter part of which period, unless steam of unusually high pressure is available, live steam also is introduced into the body of the oil.

If it is desired to separate the solvent naphtha from the heavy naphtha left in the still, and small quantities of wash oil carried over, live steam is continually admitted into the body of the oil through a perforated pipe running along the bottom of the still. By this means the solvent naphtha will be driven off rapidly. The residue may be returned to the debenzolized oil tank.

The different fractions are condensed in a worm condenser, any remaining water is removed by the separator, and the benzol is run into the crude benzol storage tank, the crude toluol into the crude toluol storage tank, and the solvent and heavy naphthas are collected either in one or two tanks as desired.

The benzol fraction thus obtained will contain about 85 per cent. of pure benzol and olefines, the balance being some toluol and solvent naphtha. The toluol fraction will contain from 60 per cent. to 80 per cent. of toluol, the balance being a little benzol, olefines and solvent naphtha.

The benzol fraction then can be pumped back into the gas for enrichment, or can be carried on to the fourth stage where the refining of those oils begins. If used for enrichment, it should be examined to see if the sulphur content will stain the acetate of lead paper used in testing gas, if the benzol is introduced beyond the purifier outlet. It may be necessary to introduce it into the gas at the purifier inlet. These oils are now a light yellow in color.

In water gas the total amount of toluol will be very close to 2 per cent. of the gas oil used. If the entire light oil is sent to a refining plant and that refining plant has an efficiency of 90 per cent. in toluol recovery, we might expect to get 1.8 per cent. of the gas oil used as salable pure toluol. If the benzol fraction is replaced in the gas and only the toluol fraction is sent to the refinery, there will be a loss of total toluol due to that contained in the benzol fraction and in the naphtha fraction of as much in practice as 10 per cent., so that the toluol sent to the refinery will amount to only 1.8 per cent. of the gas oil used. Assuming now an efficiency of 90 per cent. in the refining plant, the amount of pure toluol recovered for sale will be 1.6 per cent. of the gas used. The amount of toluol recovered from coal gas will be found to be about .03 gallon per thousand cu. ft.

The steam pressure, as shown by a gauge in the still house, should not be allowed to get below 100 pounds, and water should be supplied at a uniform pressure. The amount of steam required to strip the light oil from the wash oil is estimated at 1.3 horsepower per gallon of light oil per hour.

Tank for Jelly-Like Material.

There is extracted with the oils from the gas a jelly-like material which will remain with the wash oil and which, if not removed, will cause the oil to become so heavy as to make it unfit for use. It is advisable to provide an open tank, water cooled, into which a certain portion of the wash oil can be placed each day to allow this jelly and naphthalene to settle out. The clear oil can be drawn from the top and returned to the debenzolized oil tank,—the jelly being scraped out and discarded.

Scrubbers for Larger Plants.

There should be two scrubbers in tandem for plants producing more than 65 gallons of light oil per hour. Estimating on a basis of total scrubber capacity of 30 cu. ft. per thousand feet of gas per hour, it is advisable to use two scrubbers since in many cases there would otherwise be too great a weight per square feet of foundation, without unusual expense. It is even advisable, for efficiency in scrubbing, to have two scrubbers for smaller plants, although not entirely necessary.

Fig. 2 shows a suggested method of introducing the scrubbing oil in tandem scrubbers. Assuming the oil from the debenzolized wash oil tank in the larger plants to be continuously in circulation, the oil from the gas outlet scrubber is allowed to flow into the benzolized wash oil tank. It is pumped from there through a preheater into the gas inlet scrubber and the benzolized oil from this scrubber flows back into the same tank from which it was pumped. In theory this looks like poor practice to allow the wash oil to pass back into the same tank from which it was pumped to the scrubber, but in practice it will be found to work. The wash oil coming from the gas inlet scrubber will be found to be not entirely saturated with the light oils and the flow of benzolized wash oil from the gas inlet scrubber will continue to freshen the wash oil for admission to the gas inlet scrubber. If desired, in the larger of these plants the tank for receiving the benzolized wash oil from the gas outlet scrubber might be made separate from that of the gas inlet scrubber.

Smaller Sized Plants.

Apparatus for plants making from 15 *to* 40 *gallons of light oil per hour*—Plant for the recovery of toluol and isolating the toluol fraction: The maximum amount of light oil produced will probably be not over 0.5 gallon per thousand cu. ft. of gas. In a plant of 75,000 cu. ft. per hour this would amount to 37½ gallons of light oil per hour, or 900 gallons per day. Estimating the amount of wash oil introduced into the scrubber per thousand feet of gas at 15 gallons, the total amount of wash oil per day would be 75x15x24=27,000 gallons. By increasing the size of the debenzolized wash oil tank, the benzolized oil tank and the column so that the entire amount of benzolized oil that comes from the scrubber in 24 hours can be distilled through the column in 16 hours, it will permit the same column to be used for at least six hours each day for fractionating the light oil, thereby saving the expense of installation of another column and necessary building, less the cost of extra size of tank and column.

The debenzolized wash oil tank must hold at the time that the column is changed from the stripping to the fractionating process enough wash oil to permit the scrubbing of the gas to go on continuously during the time that the column is used for fractionating; that is, 75x15x8=9,000 gallons of wash oil; and the benzolized oil tank must

l a similar amount since nothing be pumped from it into the column ng the eight-hour period. Allow- 1,000 gallons extra, it would make e two tanks have a capacity of 00 gallons each.

he procedure is shown in Fig. 3 and ıe same as Fig. 1, up to the outlet he stripping column. In this case vapors of the light oil pass through planer into the condenser, then ıugh the water separator and then the still base that is to be used fractionating the light oil. The lensate from the planer is treated before. The base of the column is connected to the light oil re- er, to be used as a still base. On pipe leading from the water sepa- r to the light oil still base an outlet, ı runs being suitably valved, leads ı header to the crude toluol and le benzol tanks. Also the pipe ing to the light oil still base is ed off and the benzol and toluol lensates from the condenser will ı pass through to their proper tanks.

he selection of 15 gallons of light per hour as a minimum production which this apparatus is recommend- is purely an arbitrary figure, the ıght being that in some works mak- less than 15 gallons of light oil hour and others making more than gallons of light oil per hour, the tion with respect to some other t might be such as would justify n in sending their light oil to be illed at a larger plant and doubling up with some other gas works fairly close in the fractionating operation. The amount of light oil that would be produced in a plant making 1,000,000 cu. ft. of gas per day will not be over 500 gallons and this could be shipped in 100-gallon drums at the rate of about one carload in 10 days. Larger plants located within short distance of each other, such as in New England, might well make some mutual arrangement regarding the fractionating operation.

Lighting.

The lighting of these plants should be confined exclusively to electric incandescent lights in double vapor-proof bulbs with wire guards. The light oil is volatile at all ordinary temperatures and several fires have resulted from flashes, such as the breaking of single bulb incandescent lamps, that have caused serious damage. No extension cords should be allowed.

Refining the Toluol Fraction.

While it now appears unlikely that any of the gas companies will be called upon to define the toluol fraction, a brief description of the method follows. We believe that there is a difference in the treatment of the light oil recovered from water gas and that recovered from coal gas.

Fourth Stage—Washing the Fraction.

This consists of treating the toluol fraction with sulphuric acid for the purpose of separating the olefines from the oils of the benzene series. This work is done in an agitator or washer, which consists of a lead-lined casing having a capacity of from 100 to 5,000 gallons. It is equipped with apparatus for agitating or stirring the oil in order to get a thorough mixture. Sulphuric acid of about 66° Bé. is added in small quantities, stirred, allowed to settle and the sulphonated olefines are then drawn off from the excess acid from the bottom. More acid is added, again stirred, and again the residue is drawn off. This operation is carried on for four or five times. The olefines are each time converted into an acid sludge that looks like tar. Too much acid added at one time, or too lengthy agitation will be indicated by a lumpy condition of the tar. The time required for this treatment is about six hours. For water gas, the amount of acid used is about eight-tenths of a pound per gallon of crude toluol fraction introduced.

After the olefines have been removed (which can be determined by taking a sample to the laboratory and treating with additional acid), a solution of caustic soda is added to neutralize the remaining acid. The material is then left to stand quiescent in the agitator until all of the caustic soda solution, some of which will have been converted into sodium sulphate, settles to the bottom. This is then drawn off.

Note: The toluol can also be destroyed by treatment with highly concentrated sulphuric acid and it is desired to use the sulphuric acid in such strength and such quantities as will

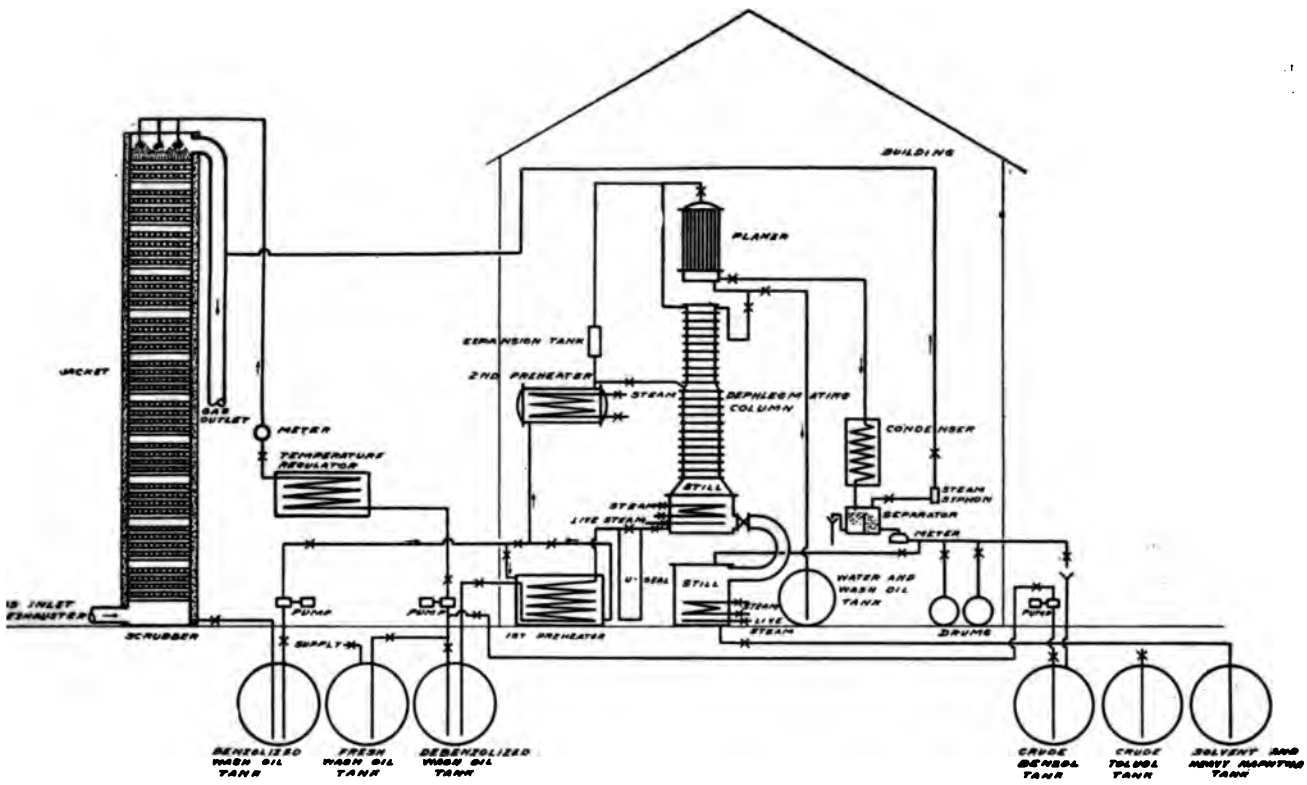


Fig. 3—Plant for Scrubbing Light Oils from Coal or Water Gas and for Fractionating the Oils. For Capacities from 15 to 40 Gallons of Light Oil Per Hour.

completely eradicate the olefines and leave unharmed the toluol.

Fifth Stage—Toluol from Water Gas.

The washed toluol fraction is then pumped into a straight steam still fitted with a nest of steam coils in the body of the oil through which the heat is transmitted to the oil. The still has no column, but the vapors from the still pass directly through the condenser, coming out into liquid form and this liquid passes upwards through a tank containing a solution of caustic soda. It flows from the top of the soda washer into the refined toluol tank.

Note: Investigation seems to prove that in the treatment by sulphuric acid in the washer of the olefines contained in the toluol fraction, that there are some sulphonated olefines remaining in suspension in the oil that will not be precipitated or be affected by the caustic soda, but travel with the washed commercial toluol. As soon as this material is heated in the still, these sulphonated olefines are again decomposed with the evolution of sulphuric acid, which attacks the still and particularly the planer and condenser. Therefore, we recommend for smooth operation of the refining plant where water gas toluol is being refined, that a still as above described be used and that the connections to the worm coil, the coil and the outlet of the soda washer be made of lead. For the refining of toluol from coal gas this does not appear to be needed.

Sixth Stage.

The toluol is now ready for the sixth stage, which consists of passing it through a refining still. This is an indirect steam heated still of from 1,500 to 10,000 gallons capacity, on which is superimposed a proportionate column of some thirty-two sections. The planer at the top is fitted with thermostats so that the temperature can be carefully controlled and distillation carefully watched.

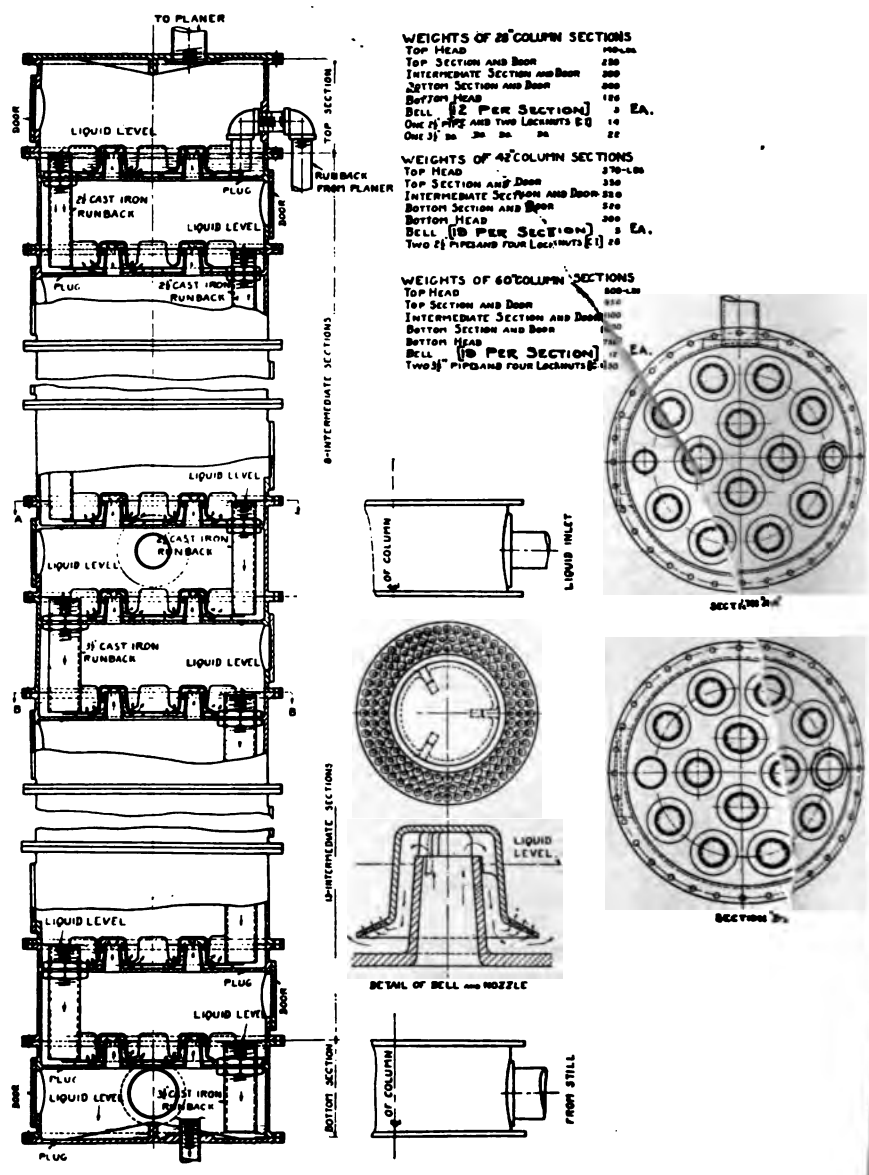
The material in the still is now made up of some benzol, a large percentage of toluol and some solvent naphtha. When the fraction in the still starts to vaporize, the temperature in the planer is so adjusted as to allow only the pure benzol to go forward as a vapor and condensing any toluol or solvent naphtha that may have worked up through the column, which condensed toluol or solvent naphtha will then drop back into the column again.

The first runnings of the still will be pure benzol. The very first runnings may not come quite within the specifications for pure benzol, being somewhat too light. After the pure benzol has come off, the still runnings will decrease in rate. The temperature in the planer is then increased and the material in the still will rise in temperature until the boiling point of toluol is reached, when a period will ensue during which the liquid in the column will be gradually increasing in its toluol strength and decreasing in its benzol strength, and the material flowing from the condenser will be an intermediate fraction consisting of benzol and toluol, which must be drawn into drums and returned to the still for redistillation in the next or later charges. Then the pure toluol will begin to come off. After the toluol is finished, the residue in the still will consist of refined solvent naphtha. The production of pure toluol, therefore, will always be accompanied by the production of small amounts of pure benzol and refined solvent naphtha. During the operation there will be a disappearance of toluol and it will be necessary to follow up each stage with sufficient laboratory equipment to intelligently conduct the distillation.

There will be required in the operation of these plants a sufficient knowledge of chemistry and chemical equipment in the laboratory to check up each stage of the process. We call attention to the paper entitled "The Analysis of Small Quantities of Light Oil," by Frederick W. Sporr, Jr., and A. Allison Kohr, of the H. Koppers Co., published in the August, 1917, issue of the "Gas Institute News," page 373. The process just described is one that has been in operation for several years and represents a good, workable installation. It is not claimed that this is the best in all details. Specialists in the installation of toluol recovery plants will doubtless have their own solution of various details. This committee holds itself ready to give further information and go promptly into all details that may be asked for.

Chemical Control of Recovery Plants.

It may not be out of place here to



CROSS-SECTION OF DEPHLEGMATING COLUMN.

Fig. 4.

speak briefly of the chemical characteristics of the hydrocarbons in the gas and of the chemical or rather physical testings that are necessary to control the operation of a recovery and fractionating plant. The important hydrocarbons are what is known as the benzene homologues, some olefines or unsaturated hydrocarbons, and small quantities of carbon bisulphide, thiophene and several others of lower boiling point are present as impurities. Of the benzene homologues we have benzene toluene and a mixture of xylene and some higher boiling members known commercially as solvent naphtha. These are colorless and rather sweet smelling liquids (when pure) with a rather high refractive index as an evidence of their ring structure. Some of their physical characteristics are given in the following table:

Name.	Chemical Formula.	Boiling Point at 760mm=29.92"Bar.	Melting Point.	Sp. Gr. at 15½°C=60°F
Benzene	C_6H_6	80.4°C=176.7°F	+ 5.4°C=+ 9.7°F	8840
Toluene	$C_6H_5.CH_3$	110.4°C=230.7°F	— 92.4°C=—134.3°F	.8714
M. Xylene	$C_6H_4.(CH_3)_2$	139.2°C=282.6°F	— 54.8°C=— 57.6°F	.8697

The commercial products are known under a variety of names, as, for instance, the purest products are known as "C. P." or "pure," are usually expected to boil or distill within 2°C.=3.6°F. and have for benzene a specific gravity at 15½°C. of .883 to .885 and to be free of olefines and contain only traces of sulphur compounds; and for toluene to have a gravity of .869 to .871, to be free from olefines, and contain not over ½ per cent. of paraffin hydrocarbons.

There are a number of commercial grades of benzene known as 100 per cent., 90 per cent., 50 per cent., etc.; this does not mean that the article contains 100, 90, 50 per cent. of pure benzene, but that the percentage by volume indicated will distill over under certain conditions at 100°C.=212°F.

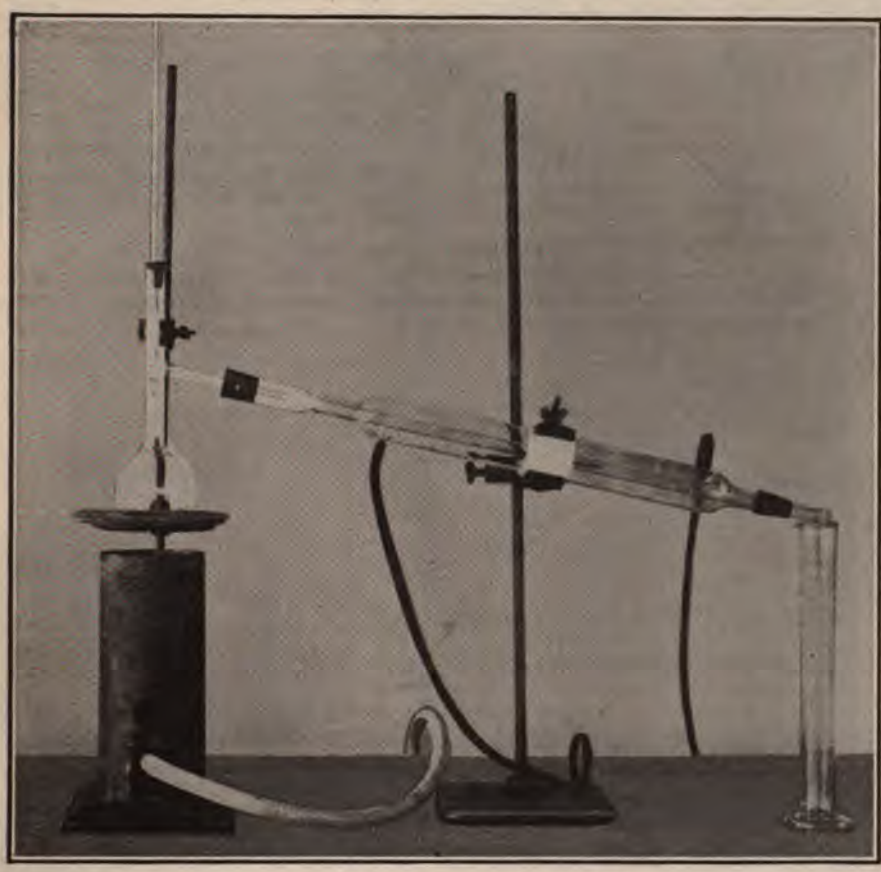


Fig. 5—Apparatus for Distillation Test.

Since these hydrocarbons are valued almost exclusively by the distillation test it will be briefly described, although the gas Chemists Handbook, pages 180-187, gives a complete description. The apparatus used is shown in Fig. 5.

One hundred c.c. of the fraction to be examined are placed in the Engler flask of specified dimensions supported on a piece of asbestos board having a 1½" circular hole in the center. The flask is connected with a glass condenser and a thermometer graduated to 1/5° or 1/10"C. is inserted in the neck of the flask. The heating is done with a bunsen burner and is carried at such a point that the distillate from the end of the condenser can just be counted as distinct drops, not a continuous stream. The distillate is caught in a graduated cylinder. When the first drop of distillate leaves the end of the condenser tube the temperature of the thermometer is noted as is given as first drop. When the last drop of liquid leaves the bottom of the flask the temperature is noted as the dry point.

In distilling benzene, toluene, etc., it is necessary to observe the barometer and correct the thermometer readings accordingly, as an increase of one inch or 25.4 m. m. in barometric pressure would increase the boiling point of benzene 1.09°C. or 1.97°F. and for toluene 1.19°C. or 2.15°F. and vice versa. In determining specific gravity the temperature must be observed within 0.1°C. in order to obtain accurate results.

It will be evident that the operation of a toluene recovery plant will require in addition to the mechanical engineering features a certain amount of chemical control. This will naturally vary with the size of the plant. Many of our larger gas plants already have a chemist who can readily pick up the technic of this work, but the amount of the work involved in a large plant of say four to five millions per day will keep two men busy, while in the smaller plants the work can be cut down so that a bright high school boy can be taught in a few months to make the control tests essential for operation.

Nature of Tests.

The tests will naturally divide themselves into: (a) The determination of the hydrocarbon vapors present in the unscrubbed gas and those remaining in gas after scrubbing. This will give directly the efficiency of the plant. (b) The determination of the percentage of hydrocarbons or light oils in the benzolized and debenzolized wash oils. This regulates the amount of wash oil used and the operation of the debenzolizing apparatus. (c) The valuation of the light oil and the fractions made from the fractionating still for their content of benzene toluene, etc. This determines the yield from the plant and regulates the operation of the fractionating still. (d) In the larger plants there are many other subjects for control, viz.: The quantity of wash oil;

the presence of paraffin in the light oil; the amount of olefines and other impurities; relation of temperature in various parts of the plant to efficiencies, etc., etc.

Outline of Methods Used.

Detailed descriptions of the methods used are given in the Gas Chemists' Handbook, Gas Institute News, 1917, London Journal of Gas Lighting, etc., and will not be repeated here, but the tests will be outlined. In determining the hydrocarbon vapors in the gas a sample is passed slowly through either a train of some ten wash bottles containing straw oil or oleic acid, or through a smaller tower, and the light oil absorbed is recovered by distilling with steam. After washing with acid and soda solution to remove olefines the light oil is dephlegmated to remove traces of wash oil and the distillate is calculated to gallons per ton of coal carbonized or as a percentage of the gas oil used. In the control of the benzolized and debenzolized wash oil a large average sample is steam distilled and is washed and dephlegmated (See Fig. 6.) In the case of the debenzolized wash oil any light oil recovered is distilled to determine whether any toluene has escaped recovery.

Practically every large interest has developed its own special method for the valuation of the light oil and fractions. A number of these methods have been described in the literature before quoted. In general after the washing with acid and alkali and dephlegmation the distillate is repeatedly dephlegmated into certain empirical fractions and these are further examined by distillation in an Engler flask as before described or the gravity is determined, etc., and by reference to tables and curves made up from known mixtures of pure materials quite satisfactory valuations can be made.

Paraffin hydrocarbons are detected by abnormally low gravities of the pure fractions and may be determined by nitrating samples and determining the residue or by the use of very strong sulphuric acid and centrifuging the resulting mixture of sulphonic and sulphuric acids, when the unacted on paraffin will rise to the top of the container.

For the smaller plants a simple distillation of the light oil and fractions with frequent examination of the debenzolized wash oil will furnish the essential data for operation. A typical set of determinations would be as follows:

Light oils in unscrubbed water gas ..... .389 gallons per M
Or 9.73 per cent. of gas oil used.
Light oils in scrubbed gas..... .048 gallons per M
Or 1.20 per cent. of gas oil used=88 per cent. recovery
Light oil in benzolized wash oil .....3.15 per cent. by volume
Light oil in debenzolized oil ..... .30 per cent. by volume
First drop on recovered oil was 138°C., indicating little if any toluene.

Light Oil

Distillation Test. Temperature.		Valuation.
71°C.	1st drop	
80	1	Benzene 30.8 %
85	2	
90	4	Toluene 19.0 %
95	13	
100	18	Sol. Naphtha 6.2 %
105	33	
110	41	Residue 11.0 %
115	47	
120	52	
125	55	
130	59	
135	62	
140	64	
150	68	
170	75	
200	86	
244	Dry Point.	

STILL FRACTIONS.

First	First Receiver Drop. 60°C.	Benzene Fraction 76°C.	Intermediate Fraction 93°C.	Toluene Fraction 104°	Intermediate Fraction 109°	Sol. Fraction 130°
70	2%					
75	13					
80	80	54				
85	95	98				
90						
95			1			
100			9			
105			50			
110			94	48		
115				92	1	
120				96	5	
125					22	
130					55	
135					79	5
140					95	15
150						65
160						91
Dry Point	90°	87°	112°	124°	148°	180°

Details of Scrubbing Plant.

Gas scrubbers should be filled with trays of the ordinary pattern. They should be designed to have a shell volume of 30 cu. ft. per M. per hour, during periods of maximum make. For capacities of more than 125 M. per hour there should be preferably two scrubbers in tandem, each not less than 45 feet in height. Since in water gas the quantity of light oil recoverable is proportionate to the amount of gas oil used, and not to the quantity of gas scrubbed, the figures given in the accompanying tables of details of sizes are in units of gallons of light oil recovered per hour. The light oil from water gas is estimated at ten per cent. of the gas oil used per hour, and for coal gas at 3.5 gallons of light oil per net ton of coal carbonized. The temperature of the gas entering the scrubbers should not be over 95°F. The necessity of preliminary gas coolers will therefore depend on local conditions.

Refining by Districts.

It has been found by the committee that it is probable that the present refining plants will be sufficient to take care of the extra production, and we have dealt in the previous items on the advisability of installing a still for fractionating the crude toluol.

Monthly Production.

The percentages of yearly production that will be recovered each month will be about as follows:

January	9.3%
February	8.7%
March	8.6%
April	7.4%
May	7.8%
June	7.7%
July	7.0%
August	7.0%
September	8.1%
October	9.2%
November	9.0%
December	10.2%

Type of Gas Oil or Fuel.

This cannot be even guessed at. Gas companies are now glad to get anything; generally no two tank car loads are alike. If it is found that serious attention must be given to this because of high paraffins, the matter will have to be gone into very thoroughly and the gas companies aided in buying oil suitable for toluol production.

Loss of Candle Power and Heating Value.

Water gas:

For every gallon of oil used there may be extracted one-tenth of a gallon of light oil.		
The illuminating value given to one thousand feet of gas by one gallon of gas oil will average approximately	5.75	candles
The illuminating value lost by the extraction of one-tenth of a gallon of light oil is	2.86	"
Remaining candle power after extraction of light oil	2.89	"

If the crude benzol fraction containing olefines is returned to the gas, the candle power restored will be..... .91 "

Candle power of gas sent out ..... 3.80 "

Or 66 per cent. of the original candle power.

The average oil used per M. by the gas companies from which we propose to recover toluol is 3.8 gallons. Estimating as herein shown a loss of 1.95 candles per gallon, the average loss in candle power will be 7.4 candles. Similarly, the average loss in heating value will be about 27 B.t.u., or a loss of about five per cent. of its heating value. With the exception of some of the larger gas companies operating on a high candle power basis, it would be physically possible to restore the gas to the present established standard of quality by the use of more gas oil per M. To restore the 27 B.t.u. per M. it would be necessary to add not less than .26 of a gallon of oil per M.

The gas companies under consideration will make in 1918 approximately 110,000,000 M. cu. ft. of water gas, which, requiring .26 of a gallon of gas oil additional per M., per year will aggregate 28,600,000 gallons. It is probable that this will not be available and the gas companies will not be able to restore this gas to its present quality. It is evident that it would be impossible to restore the high illuminating value of some of the larger plants.

Willingness To Scrub.

Every one of the gas companies enumerated has some standard of quality of gas which they are required to maintain, and failing, which subjects them to penalties involving fines, loss of reputation and good will of the community served and may extend to the impairment of their capital invested in the business. Public service corporations are peculiarly exposed to quick and general publicity if it is believed that they are negligent or have not used all possible means to comply with their contract or charter obligations or regulations fixed, after conference, by the public service commissions having regulatory power over them.

It will be necessary, therefore, that there be set forth the new conditions under which the gas companies will operate their plants. They must have an opportunity of studying what effect any new requirements will have upon their obligations to their consumers and to their ability to continue in the proper conduct of supplying the community with gas. Among these may be enumerated:

(a) By whom the installation of the recovery plants will be financed.

Detail Sheet
Light Oil Recovery and Fractionating Plants
Capacities above 65 Gallons of Light Oil per Hour

	#1 150 Gallons Light Oil per Hour	#2 100 Gallons Light Oil per Hour	#3 65 Gallons Light Oil per Hour
Oil Temperature Regulator - Heating Surface	1,650 Sq. ft.	1,100 Sq. ft.	687 Sq. ft.
Benzolized Wash Oil Tank	10,000 Gallons	8,000 Gallons	6,000 Gallons
Oil to Oil Heat Exchanger - Heating Surface	900 Sq. ft.	600 Sq. ft.	375 Sq. ft.
Steam Preheater for Oil - Heating Surface	1,800 Sq. ft.	1,200 Sq. ft.	750 Sq. ft.
Debenzolizing Column - Top Sections	8-28" Diam.	6-28" Diam.	6-28" Diam.
- Bottom Sections	18-42" Diam.	14-42" Diam.	16-28" Diam.
Planer Debenzolizing Column - Cooling Surface	600 Sq. ft.	400 Sq. ft.	250 Sq. ft.
Condenser - Cooling Surface	750 Sq. ft.	500 Sq. ft.	300 Sq. ft.
Water Separator	2"x 4"x 3"	2"x 3"x 3"	2"x 2½"x 2½"
Light Oil Storage Tank	10,000 Gallons	7,200 Gallons	4,500 Gallons
Debenzolized Wash Oil Tank	10,000 Gallons	8,000 Gallons	6,000 Gallons
Storage Tank for Reserve Straw Oil	10,000 Gallons	8,500 Gallons	6,500 Gallons
Cooling Pans for Removing Resin	1,000 Gallons	700 Gallons	500 Gallons
Fractionating Still			
Capacity of Still Body	6,000 Gallons	4,000 Gallons	2,500 Gallons
Heating Coils - Heating Surface	600 Sq. ft.	400 Sq. ft.	250 Sq. ft.
Column	22-42" Diam.	12-42" Diam.	22-28" Diam.
		10-28" Diam.	
Planer - Cooling Surface	375 Sq. ft.	250 Sq. ft.	156 Sq. ft.
Condenser - Cooling Surface	375 Sq. ft.	250 Sq. ft.	156 Sq. ft.
Water Separator	16" Pipe	12" Pipe	10" Pipe
Crude Benzol Tank	10,000 Gallons	8,500 Gallons	6,500 Gallons
Crude Toluol Tank	10,000 Gallons	8,500 Gallons	6,500 Gallons
Residue Tank	10,000 Gallons	8,500 Gallons	6,500 Gallons
Pumps: Oil to Primary Scrubber	450 Gallons per min.	300 Gallons per min.	195 Gallons per min.
Oil to Secondary Scrubber	150 Gallons per min.	100 Gallons per min.	65 Gallons per min.
Oil to Still	150 Gallons per min.	100 Gallons per min.	65 Gallons per min.
Light Oil To Still	75 Gallons per min.	50 Gallons per min.	32 Gallons per min.
Reserve Pump	150 Gallons per min.	100 Gallons per min.	65 Gallons per min.
Thermostats: Preheater 240°	1	1	1
Planer 210°	1	1	1
Temperature Regulator 120°	1	1	1
Meters: Scrubbing Oil - Disc Type	85 Gallons per min.	55 Gallons per min.	40 Gallons per min.
Light Oil Condensation Type	200 Gallons per Hour	150 Gallons per Hour	100 Gallons per Hour
Distillate Oil - Indicating Type.	400 Gallons per Hour	300 Gallons per Hour	200 Gallons per Hour
Thermometers: Recording	7	7	7
Indicating	12	12	12
Pressure Gauges: Indicating	14	14	14
Piping: Scrubbing Oil	4"-7"-10"	2½"-5"-8"	2"-4"-6"
Vapor	6"	4"	4"
Light Oil	2½"	2"	1½"
Steam Supply	4"	3"	2½"
Water Supply	3"	2½"	2"
Steam Required-pounds per Hour	8,250# Max.	5,500# Max.	3,500# Max.
Water Required-gallons per Hour	5,250 Gallons Max.	3,500 Gallons Max.	2,280 Gallons Max.

Fig 6—Apparatus for Dephlegmation.

(b) By whom the recovery plants will be operated, with a view to preventing any irregularity in the operation of the toluol recovery plants interfering with the regularity of supply of gas to the consumer.

(c) If the gas companies operate the recovery plants, at what price is the toluol to be sold? The selling price of the toluol should at least cover the cost of operation, which will undoubtedly be higher in some of the larger companies, and which may also be higher if the candle power or heating value is to be restored wholly or in part; the shrinkage of gas due to the loss of the volume of the vapors of light oil; the extra cost of manufacturing gas due to the close proximity of a hazardous undertaking and the necessary overhead charges in the conduct of the business. In some cases there may be an extra charge for the rental of real estate since it is to be assumed that some of the companies will not be able to house these plants in their present confined space and the erection of which in close proximity to other plants may not be permitted by their fire insurance regulations. Fire walls will add to cost of installation.

(d) The ability of the gas companies to cover the full scope of their business of supplying gas to their consumers along their lines of mains, and such extensions of mains as are covered by statutory requirements. If there is to be a reduction in the heating value sufficient to require more gas to supply the consumers' needs, that is, if the consumers must pay for more gas to get the same amount of work done (a question on which there is a very great difference of opinion), it may, with the other demands made upon the gas companies, require them to meet a larger demand for gas than they can supply. Gas making materials are not only at unprecedented high price but every manager of gas companies is now spending much of his time in getting materials at any price.

Next to water, artificial gas is the most important and essential article entering into the domestic life of our cities. For years modern houses and apartments have been erected with no thought of anything but gas as a fuel for cooking, heating water and for local room heating. In a vast number of these homes nothing else can be used, no flues having been provided for coal stoves, and no storage for coal or ashes. In many cities it is not unusual to have from 85 per cent. to 95 per cent. of the homes dependent upon gas ranges for cooking. In many cities 80 per cent. of all the homes depend exclusively upon gas for lighting. When there are abnormally high prices for domestic coal, or when there is a shortage of such coal, the consumer is accustomed to turning to gas and in many places during periods of unusually cold weather the demand for gas largely increases. If to these are added an increased consumption due to the fact that some of the elements of heating value and candle power *put into the gas have been taken out and diverted to other uses,* the demand upon many of the gas works may be more than they can supply.

Therefore, during the period of toluol recovery the gas companies may have to go to the expense of comparatively large additional installations to their entire manufacturing plants. This is not a theory but a condition that the gas companies today have to meet. After a period (from 1912 to 1915) during which there was an exceedingly low rate of increase in the amount of gas sent out by gas companies, 1916 and 1917 have both been years of unusual increase in the demand for gas. The gas companies are looking with considerable apprehension to this coming year in view of all the conditions as stated above, which are in the direction of heavier burdens on the gas companies' output.

Therefore, the answer to the question regarding the willingness of gas men to respond to the need for toluol can be summed up in the statement that the managers of gas companies now are fully occupied in preparing themselves to meet the unusual demands of their business. They do

Detail Sheet
Light Oil Recovery Plants
Capacities less than 65 Gallons of Light Oil per Hour.

	#4 40 Gallons Light Oil per Hour	#5 25 Gallons Light Oil per Hour	#6 15 Gallons Light Oil per Hour
Oil Temperature Regulator - Heating Surface	412 Sq. ft.	247 Sq. ft.	165 Sq. ft.
Benzolized Wash Oil Tank	10,000 Gallons	3,000 Gallons	2,000 Gallons
Oil to Oil Heat Exchanger - Heating Surface	300 Sq. ft.	135 Sq. ft.	90 Sq. ft.
Steam Preheater for Oil - Heating Surface	600 Sq. ft.	270 Sq. ft.	180 Sq. ft.
Debenzolizing Column	20 - 28"	12 - 28"	9 - 28"
Planer Debenzolizing Column - Cooling Surface	200 Sq. ft.	90 Sq. ft.	60 Sq. ft.
Condenser - Cooling Surface	250 Sq. ft.	112 Sq. ft.	75 Sq. ft.
Water Separator	2" Pipe.	1" Pipe	1" Pipe
Light Oil Storage Tank	1,000 Gallons	4,000 Gallons	4,000 Gallons
Debenzolized Wash Oil Tank	10,000 Gallons	3,000 Gallons	2,000 Gallons
Cooling Pans for Removing Resin	500 Gallons	300 Gallons	200 Gallons
Fractionating Still Attached to Debenzolizing Column	1,200 Gallons		
Heating Coils - Heating Surface	250 Sq. ft.		
Water Separator for Distillate Oil	8" Pipe		
Crude Benzol Tank	6,500 Gallons		
Crude Toluol Tank	6,500 Gallons		
Residue Tank	6,500 Gallons		
Pumps — Oil to Scrubbers	40 Gallons per min.	25 Gallons per min.	15 Gallons per min
Pumps — Oil to Debenzolizing Still	40 Gallons per min.	25 Gallons per min	15 Gallons per min
Pumps — Reserve	40 Gallons per min.	25 Gallons per min.	15 Gallons per min
Thermostats — Preheater 240°	1	1	1
Thermostats — Planer 210°	1		
Thermostats — Temperature Regulator 120°	1	1	1
Meters — Scrubbing Oil Disc Type	30 Gallons per min.	15 Gallons per min	10 Gallons per min
Meters — Light Oil - Condensation Type	60 Gallons per Hour	40 Gallons per Hour	25 Gallons per Hour
Meters — Distillate Oil Indicating Type	100 Gallons per Hour		
Thermometers — Recording	5		
Thermometers — Indicating	8	8	8
Pressure Gauges Indicating	14	10	10
Piping — Scrubbing Oil	1½" - 3" - 4	1¼" - 2½" - 4	1" - 2" - 3
Piping — Vapor	3"	3"	3"
Piping — Light Oil	1½"	1"	1"
Piping — Steam Supply	2"	1½"	1½"
Piping — Water Supply	2"	1½"	1½"
Steam Required - pounds per Hour	2,200 Pounds	1,370 Pounds	825 Pounds
Water Required - gallons per Hour	1,400 Gallons	875 Gallons	525 Gallons

not look upon the toluol recovery plants as a desirable investment or as a source of large profits, but if the government will state with authority how the procedure is to be carried on, if at all, and it can be shown to them that they will receive a moderate profit to cover all costs of operation and depreciation, they will respond energetically and cheerfully to the call.

Is Scrubber Oil Available?

The amount of wash oil required for the first installation will be about 1,000,000 gallons. This oil, if straw oil, should be of about the following specifications: (1) The gravity at 60°F. shall be not less than 34° Be. (2) The flash point, open cup shall be not less than 275°F. (3) The viscosity in Saybolt viscosimeter at 100°F. shall be not more than 70 seconds. (4) The pour test shall be not over 30°F. (5) When 500 cc. of the oil are distilled with steam at atmospheric pressure collecting 500 cc. of condensed water, not over 5 cc. of oil shall have distilled over. (6) The oil remaining from the steam distillation shall be poured into a 500 cc. cylinder and shall not show any permanent emulsion. (7) The oil shall not lose more than 10 per cent. by volume in washing with 2½ times its volume of 100 per cent. sulphuric acid. Note: The oil is vigorously agitated with the acid for five minutes and allowed to stand for two hours.

Care should be exercised in not allowing the smaller gas companies, not equipped with large laboratories, to use a quality of straw oil that will not readily separate from the light oil or emulsify with it, so that there shall not be an undue amount of wash oil going forward with the light oil or a loss in scrubbing efficiency by reason of some of the light oil remaining with the debenzolized oil. Steps should be taken at once to secure a million gallons of such grade of oil, or a proper substitute, as previously stated, should be secured ahead because it is clear that there is going to be a large excess of creosoting oil of the quality required.

Cost of Operation.

The cost of operation of the plants for separating the toluol fraction will be at a minimum in those large plants that are not required to restore the heating value or candle power standards by the use of additional gas oil, which of course, should be charged to the cost of the toluol. Until the method that will be pursued in financing and operating these plants is fixed upon, it would appear to be idle to speak of the cost of recovery. This recovery, as now conducted in various plants, ranges from 25 to 75 cents per gallon of crude toluol, exclusive of amortization, interest on investment or depreciation.

STORAGE OF COAL.

Tests Show That Deterioration in Heating Value Is Generally Over Estimated.

A report on the deterioration in the heating value of coal during storage, covering a five-year period, has just been issued by the Bureau of Mines, Department of the Interior, as Bulletin 136, Horace C. Porter and F. K. Ovitz being authors. The tests show that the amount of deterioration of coal in heating value during storage has commonly been overestimated. Except for the subbituminous Wyoming coal, no loss was observed in outdoor weathering greater than 1.2 per cent. in the first year, or 2.1 per cent. in two years.

The loss in heating value is given for New River and Pittsburgh coals during five years, storage in the open air and under water, for Pocahontas during two years' storage in the air, and for Sheridan, Wyoming, coal during two and three-quarters years' storage in the air.

The tests with New River and Pittsburgh coal were made to determine the advantage to be gained by storing coal under water, and particularly under salt water. The results show that storage of New River coal under water effectively prevents deterioration of calorific value and that storage in the air under severe conditions causes only small deterioration, about one per cent. in one year's exposure and about two per cent. in two years. After two years the loss is continuous but slow, reaching 2.5 to 3 per cent. in five years. The deterioration of Pittsburgh coal during one year's open-air storage was practically negligible. During the second, third, fourth and fifth years the deterioration proceeded very slowly and did not reach an amount greater than 1.1 per cent. in five years. The submerged portions suffered no loss measurable by the degree of accuracy of the methods used.

The tests of Pocahontas coal, a semi-bituminous type, were undertaken chiefly to determine the effect of tropical conditions in Panama. They were made on an outdoor pile of 100 tons of run-of-mine coal. During two years' outdoor exposure this coal deteriorated less than one per cent. in heating value.

The Sheridan, Wyoming, subbituminous coal, known also as "black lignite," is commonly supposed to deteriorate rapidly in storage, especially by "slacking" or crumbling of the lumps. Under the conditions of the tests this coal lost 3 to 5.5 per cent. of its heat value in two and three-fourths years' storage, the greater part of this loss being in the first nine months. In general, the lumps became badly cracked, but retained their form sufficiently to permit ready access of air. However, they were weakened so that they broke up badly on handling. By the use of bins with air tight bottoms and sides and a protecting layer of fine slack on the surface, the deterioration of Sheridan coal in heat value can probably be kept below three per cent. in one year and the physical deterioration can also be largely prevented in the under portions of the pile.

The results show that the amount of deterioration of coal in heating value during storage has commonly been overestimated. With coal such as New River and Pittsburgh the expense of underwater storage equipment is not justified except as a preventive of fires from spontaneous combustion.

Detailed results and a full account of the tests and analytical data are given in the bulletin, which may be obtained free of charge by addressing the Director of the Bureau of Mines, Washington, D. C.

Chemists Engaged in Coal, Gas Tar and Coke Work Rank Fifth.

In a classification of 29 industrial groups of the 15,000 chemists engaged in various lines of work in the United States, those coming under the head of "Coal, gas, tar and coke" rank fifth from a standpoint of numbers employed. This group contains 1,294 chemists according to a preparedness census recently completed by Albert H. Fay and published in technical paper 179 issued by the Bureau of Mines, Washington, D. C.

New Publications of the West Virginia Geological Survey.

The West Virginia Geological Survey will issue during the month of October, 1917, three very important publications. The geologic map has already been issued, and the railroad map, and report and maps of Clay and Braxton counties will make their appearance near the close of the month. The coal, oil, gas, limestone and iron ore map can be delivered now, and any advance orders for the other two publications will be filled in the order of their receipt as soon as the publications in question are delivered by the printers and engravers, such delivery being promised about November 1. These publications can be obtained from the West Virginia Geological Survey, P. O. Box 848, Morgantown, W. Va.

Italian Gas Company Wants Refractory Materials.

Item No. 25428 in the Daily Commerce Reports for Sept. 20, says: An Italian gas company wants to buy large quantities of refractory material and articles connected with repairs in this industry. Correspondence may be in English. References exchanged. Full particulars may be had on inquiry of the Bureau of Foreign and Domestic Commerce, at Washington, D. C., or the Federal Bldg., Chicago.

Aids Tin Baking

Kemp Gas System Ovens Bake Sheets When Placed in Vertical Position

This journal is indebted to W. W. Kemp for the following details of a highly interesting industrial gas installation that will prove valuable, no doubt, to the gas industry.

In the plant of the Federal Tin Co., the well-known tin decorators of Baltimore, a No. 8 Kemp system of 5,000 cu. ft. per hour capacity, manufactured by The C. M. Kemp Mfg. Co. of Baltimore, has been installed to heat the tin baking ovens. The ovens were built by the Federal Tin Co. and are of the horizontal conveyor type, about 3 ft. wide 8 ft. high and 90 to 120 ft. long. The most efficient operation including maximum output was required of these ovens, as of all other equipment in this modern plant. A rotary press was installed at each end of the oven, one feeding the sheets into the conveyor as it travels through the top of oven and the other feeding into the conveyor as it returns through the bottom of oven, this securing a dual use of floor space occupied, of construction cost and of fuel consumed. The ends of the wire sheet supports are bent into hooks, in which the sheets rest when these wire supports are in an inverted position while conveyor is traveling through bottom of oven.

The ovens, which are of fireproof construction and of portable sections, are heated to any desired temperature from 150° F. to 400° F. by means of the self-sustaining air and gas mixture supplied by the Kemp system, which The Kemp Co. has applied to each oven through 33 burners so arranged as to blast the flame into wrought iron tubes extending crosswise the oven near the bottom at intervals of about three feet. The ends of tubes opposite burners are closed by welded steel plates. Around the burners and the ends of tubes into which the burners enter, there are adjustable air shutters. The tops of the tubes are perforated to permit escape of the heat into oven, and so arranged as to provide even distribution throughout length of tube.

For purposes of temperature control, there are two pipe manifolds to an oven, each supplying half the burners and each with its thermostatic valve. When the burners are lighted and the flames blasted into the wrought iron tubes, the flames create a suction entraining atmospheric air through the air shutters, which combines with the combustion products and is discharged through perforations in top of tube. The entrained air takes no part in the combustion, as the air and gas mixture supplied by the Kemp system contains all the air necessary for combustion. The air shutters are made adjustable so that the proportions of air and combustion can be varied and should it ever be desired, combustion products alone can be discharged into the tubes. The length of flame at burner does not exceed six inches and no flame issues through the openings in top of tubes. As there is some little pressure in the tubes and always a discharge of combustion products from the tubes into oven, the possibility of combustible gases from the sheets becoming ignited is precluded.

It has always been the practice of tin sheet decorators to hold the varnished and coated sheets in a horizontal position while baking. After the coat of varnish is applied, the sheets are placed horizontally on racks which when filled are wheeled into an oven. Loading and emptying the racks is a slow and laborious operation, besides which dust collects on horizontally placed sheets. Tin decorators have claimed it impossible to bake varnished or coated sheets in a vertical position because of the varnish or coating running, causing the sheet to be streaked and spoiled. W. I. Tuttle, vice-president of Federal Tin Co., a man of wide experience in tin decorating and a recognized authority in his line, and others consulted, have not known of varnished or color coated sheets being held vertically and baked in continuous oven until the Kemp system of gas installation at Federal Tin Co. plant.

The advantages are: greatly increased output with reduction of labor; the one continuous oven equipment serving for printed sheets, coated sheets and varnished sheets; reduced floor space; less fuel consumption; work turned out in less time; and less equipment. It is a fact that these ovens and the Kemp system of heating are accomplishing in one hour what would ordinarily require three hours in the standard type of oven heated by the usual method.

The manner of baking varnished sheets here referred to is an improvement of no small import, and is made possible and brought about by the mixing of air with combustion products as described. Hot, dry air is an excellent drying medium and the mixture of air and combustion gases evaporates the volatiles and sets the varnish before it has a chance to run and without the temperature of the mixture being sufficiently high as to injure the product. While the conveyors are run at the maximum speed for this character of work, the varnish and coating is thoroughly baked in the passage through oven and finish is perfect.

Some idea of the difference in heating an oven as above described and by combustion products alone is had when one considers that 1,000 cu. ft. of average artificial city gas contains 56 pounds or 7 gallons of water, which is liberated in the combustion products in addition to the water produced by combustion of the hydrogen. Combustion products so heavily charged with water vapor do not readily absorb the volatiles of the varnish, as does the air and combustion gas mixture of this installation.

The Federal Tin Co. has been baking its varnished and coated sheets, as described, for six months, now has no box ovens, and is building additional conveyor ovens. The average gas combustion for all classes of work is 9,000 ft. per oven per day which is extremely light when it is considered that the ovens are doing double work, each supplied by two rotary presses and the maximum output per press 20,000 printed sheets per day or 40,000 per day per oven.

Detroit is the town that knows what big advertising will do. When there's a big emergency, whether it be a demand for more automobile sales or the adoption of a devastated French town, the big advertising interests in Detroit get their heads together and plan the publicity that puts the proposition across. The Detroit City Gas Co. doesn't have to take anyone's dust in these advertising achievements. The first Red Cross and Liberty Loan campaigns were boosted to the extent of two full page ads in Detroit papers, in space and copy donated by the gas company. They did their bit in securing subscriptions that enabled Detroit to top its quota by a considerable margin. The Red Cross ad, the work of Frank Tufts, has been widely copied in Red Cross campaign work. The employes of the Detroit company subscribed for more than $78,000 of the first Liberty Loan issue and gave $2,500 to the Red Cross.

William B. Osborne has been elected president and general manager of the Worcester (Mass.) Gas Light Co.

Gas Used in "Tank" Factory

Holt Mfg. Co., Makers of Famous Tractor Engines, Contracts for Nearly 12,000,000 Cu. Ft. of Manufactured Gas Per Month for Factory Use

By D. E. Widdersheim
Supt. Distribution, Western Gas & Elec. Co., Stockton, Cal.

After a year of efforts I have just closed contracts with the Holt Manufacturing Co., of Stockton, whereby they will use 11,329,400 cubic feet of gas per month. This gas displaces distillate in their motor testing and assembling departments; also displaces coke, coal and oil in other departments.

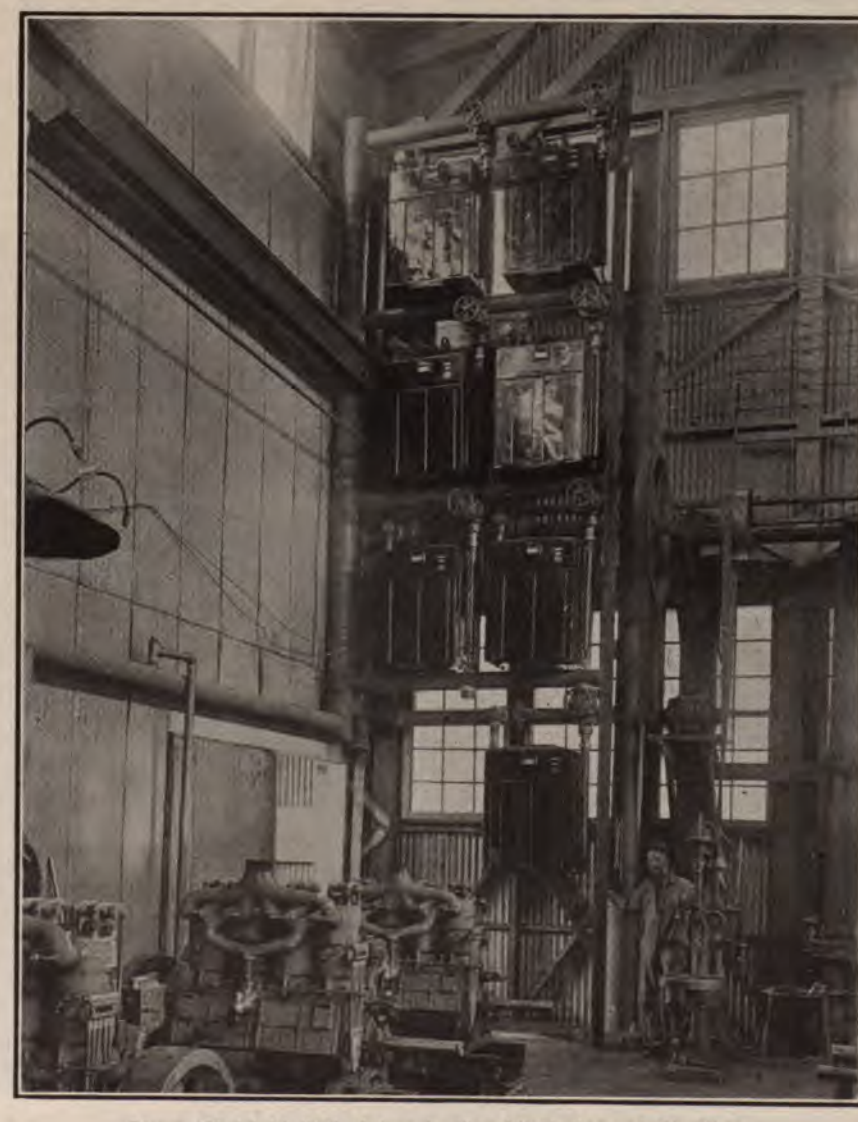
The Holt Manufacturing Co. is a large manufacturing concern covering a little more than six square blocks and it manufactures the celebrated 75-horsepower "caterpillar" tractor which is styled throughout the country by the various newspapers as "British tanks." These "tanks" are used extensively on all of the allied fronts for hauling heavy guns. The company also manufactures a 55-horsepower engine they use in their combined harvesters and 45-horsepower "caterpillar" tractors used by the French government for "tanks" and gun haulage. As a great many of these 75-horsepower tractors are shipped to England, the English government has stationed here Captain Robert W. A. Brewer, of the English Army. Captain Brewer is a gas engineer of renown and is also an expert on gas engines. Every engine shipped to the allied governments is inspected and tested by Captain Brewer. He has made a number of tests on these engines with gasoline, distillate and city gas.

Gas Highly Satisfactory.

A result of a general survey of test figures brings one to the conclusion that in so far as heat efficiency of gas is concerned, the adoption of this fuel in place of liquid, either gasoline or distillate, gives equally satisfactory service. Furthermore, the individual tests when gas is used are much closer allied than is the case with liquid fuel, due to the certainty of the measuring apparatus for the gas, while on the other hand, the gasoline carburetor is liable to small derangement and in general service does not function equally well at all engine loads and speeds and in the hands of different operators.

One important fact has been noted in using gas and that is the uniformity of the character of the exhaust and the regular beat of the engine under each and every condition. This makes for cleanliness of operation and freedom from carbon deposit which has been a great source of trouble in the past. Further, freedom from smell and noxious fumes in the engine house is not the least of the advantages which has accrued from gas testing.

A short description of the mixing device will be of interest. This consists of a barrel cock 2 inches in nominal diameter of outlet, having a restriction in the center 1½ inches in diameter. Into the throat projects a gas pipe $\frac{33}{64}$ inch internal diameter controlled by a hole in the barrel of the cock which simultaneously controls ten circular air ports, each $\frac{9}{16}$ inch in diameter. Under working conditions, the depression in the throat which acts upon the gas orifice varies from 2 inches of mercury column at 470 engine revolutions per minute to 3¼ inches of



Seven 150 Light "A" Meters in "Tank" Factory at Stockton.

mercury head at 600 revolutions per minute.

Good All Around Results.

These proportions have been found to give good all around results in working and enable the engine to run at no load equally well as at full load. This is a most important point in using fuel when variable compression results from throttling the engine, and unless the sizes and shapes of the ports are correct, difficulty will occur with the engine as soon as power demands fall off.

In the installation in question, the engines on test are coupled up to a main shaft driving four 150-horsepower air compressors and one 100-horsepower electric generator, and the power demands are continually varying so that when gasoline was used, clouds of smoke periodically issued from the engine exhaust pipes showing faulty combustion. Tests made in a similar way with city gas have not given any of these signs.

Tests are as follows with four-cylinder, 7½-inch bore by 8-inch stroke, nominal revolutions 550 per minute.

FULL LOAD.

CITY GAS—650 B. T. U.'S.

Revolutions per Minute	B. H. P. Developed.	Gas Consumption per Hour.	Cubic Feet per Minute and B. T. U.'s	Cubic Feet per B. H. P. Hour.	B. T. U.'s per B. H. P. Hour.
570	75.6	1,710	28.5 18,500	22.4	14,500
540	71.5	1,590	26.5 17,200	22.2	14,400
500	71.0	1,630	27.2 17,700	23.0	14,900
477	65.0	1,520	25.3 16,400	23.4	15,200

RED CROWN GASOLINE.

Revolutions per Minute.	B. H. P. Developed.	Pounds Fuel per Hour.	Pounds per B. H. P. Hour.	B. T. U.'s per B. H. P. Hour.
550	79.7	61	0.777	15,600
540	85.5	61	0.713	14,300
527	83.	59	0.712	14,200
516	79.9	57	0.713	14,300

Assembling Room, Preparing "Tank" Engines for Tests with Gas at Holt Mfg. Co. Plant.

Below I am giving figures of hourly, daily and monthly consumption of gas in this factory based on the above tests.

Testing and Assembling.

In their testing department they have 15 of these monster engines on test blocks running 18 hours per day and 30 days per month. Assume 18 hours a day:

1 75-horsepower engine's average consumption.... 1,600 cu. ft. gas per hour.
15 engines would consume.... 24,000 cu. ft. gas per hour.
18 hours per day.... 432,000 cu. ft. gas per day.
30 days per month....12,960,000 cu. ft. gas per month

These engines are not developing full load on test blocks, but are developing 50 per cent. load which amounts to 6,480,000 cubic feet monthly consumption.

In the assembling department they have 12 engines which they assemble during the day, and these are turned over or "limbered up" during the night; approximately ten hours running:

Each engine consumes 10 cubic feet of gas per minute or 600 cubic feet of gas per hour.
600 cubic feet per hour for 10 hours, 6,000 cubic feet of gas per day per engine.
6,000 cubic feet for 12 engines, 72,000 cubic feet of gas per day.
72,000 cubic feet for 30 days, 2,160,000 cubic feet of gas—monthly consumption in assembling department.

Summary of two departments is as follows:

	Cubic Feet Gas Monthly.
Testing department	6,480,000
Assembling department	2,160,000
Monthly consumption	8,640,000

cu. ft. gas in the two departments, all off one manifold.

This entire manifold is welded and contains 217 feet of 10-inch pipe and 201 feet of 6-inch pipe, making a total of 418 feet of 10-inch and 6-inch pipe. Leading from manifold to each engine is a 2-inch line, or a total of 420 feet of 2-inch pipe.

Factory Heating.

In California where the climate is not so severe as in the eastern country, gas is the ideal fuel for heating. In this factory we have closed a contract to heat a number of their buildings. In some cases the buildings cover an entire block. All told the contract covers the heating of 4,000,000 cubical feet of contents. The style heater adopted is the hot air ventilating type of gas radiators. There will be approximately 210 8-section radiators, or 1,680 sections. The gas consumption burning 8 hours per day will be 1,600,000 cubic feet of gas per month.

Appliances Installed During Year.

A little more than a year ago the gas bill in this factory was $3.25 per month, representing a little more than 3,000 cubic feet of gas. Last month their consumption amounted to 939,400 cubic feet.

During the year we have installed a number of appliances, some of them breaking Pacific Coast records as follows:

One 22-horsepower Kane gas-fired boiler (Pacific Coast record).

One 10-horsepower Kane gas-fired boiler.

One 500-gallon water tank with a battery of two No. 300 multi-coil Hoffman automatic heaters attached (Pacific Coast record).

One 200-gallon water tank with one No. 300 multi-coil Hoffman automatic heater attached.

Two hundred and fifty sections ventilating type gas radiators.

(*Continued on page 257.*)

Six "American" gas babbitt melting furnaces.

Also various other smaller appliances such as blast torches for soldering their radiators, etc.

Gas Is Used in Testing Department of the Holt Mfg. Co., Stockton.

Summary Monthly Consumption.

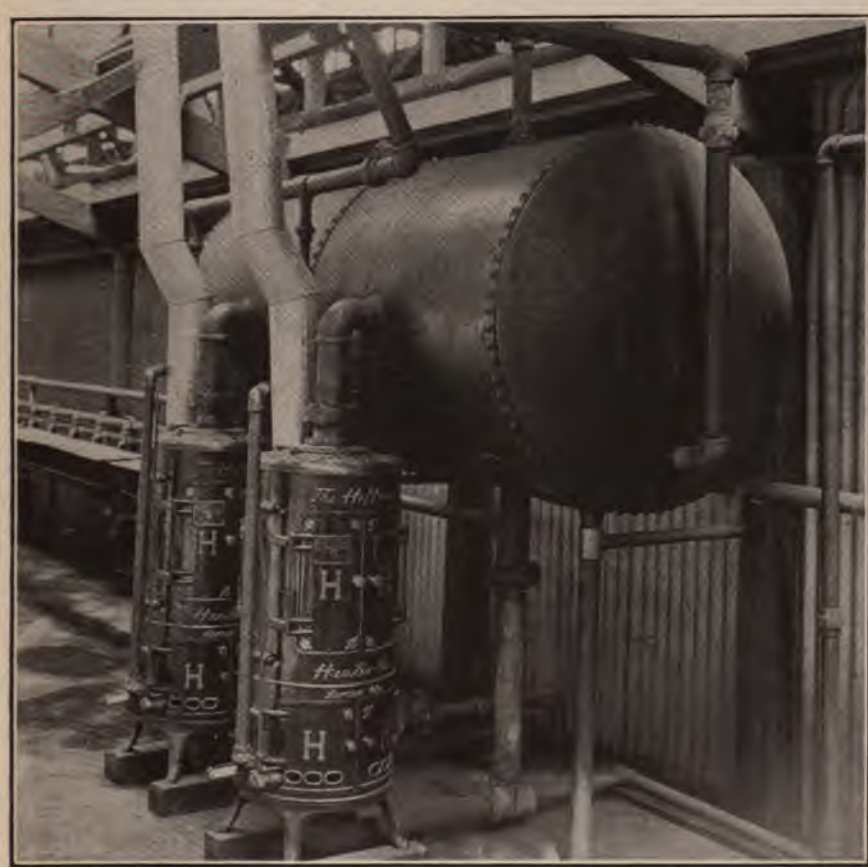
	Cubic Feet of Gas.
Motor testing department, 50 per cent. load	6,480,000
Assembling department	2,160,000
Heating buildings	1,600,000
Present consumption	929,400
Total monthly consumption	11,329,400

This is an increase of 50 per cent. of our entire output.

This business was obtained on our regular rates—effective as follows:

	Per Thousand Cubic Feet.
First 25,000 cubic feet of gas	$1.00
Second 25,000 cubic feet of gas	.90
Third 25,000 cubic feet of gas	.80
Fourth 25,000 cubic feet of gas	.70
Fifth 25,000 cubic feet of gas	.60
All over 125,000 cubic feet of gas	.55

Discount 5 cents per 1,000 cubic feet if paid on or before the tenth of the month.



Hoffman Automatic Heaters Keep the Factory Amply Supplied with Hot Water.

NEEDS TOLUOL.

Government Representative Tells N. Y. Commission of Requirements.

To urge the necessity for obtaining all the toluol available from gas companies operating in the United States, to be used in the manufacture of the explosive trinitrotoluol for American and British fighting forces. Charles H. Herty, former president of the New York Society of Chemists, appeared be fore the public service commission at its hearing on standards of gas measurements in New York, Oct. 9th.

All of this material obtainable from these sources in a year would be but half the amount required adequately to supply 1,000,000 fighting men, Mr. Herty stated. He said this statement was authorized by Brigadier-General Crozier, chief of ordnance.

"I believe this commission should take action to ensure the full weight of barrage fire essential for the protection of the men in our ranks," he declared.

Companies will be guaranteed by the government against any risks incidental to equipping their plants for the extraction of toluol, the speaker said.

Must Have Gas So One Maker Is Exempt.

If Charles Joyce had to go to war Chicago Heights (Ill.) would have to struggle along without gas, so he's not going. Illinois Appeal Board No. 3 decided the problem for him. Joyce is the only gas-maker in Chicago Heights and J. F. Small, president of the gas company, said he was indispensable.

Start Night Classes in Gas and Electricity.

At Tacoma, Wash., competent instructors have been obtained for the evening school classes in gas engineering and electricity at Lincoln high school. A large attendance in these classes is assured, since both are of special interest to the community this year.

Charles Davis Tiffany, who left the service of the Chicago gas company in 1909 to accept a position with the Union Carbide Sales Co., as manager of their business in Cuba, died October 1st.

CURRENT ADVERTISING REVIEW

In Chicago the fortnight's publicity mill evolved a definite price increase tone, as illustrated in the Peoples Gas Light & Coke Co. advertisement presented on this page. The composite range for gas and coal fuel is proving very popular in Chicago and since the manufacturer is faced with mounting costs for his raw materials, the gas company must in turn hike the prices on all new ranges coming in under the new contracts. With previous publicity on the composite range, and the incentive of low prices if bought now, the appliance should go big in the

Gas is the only *absolutely flexible fuel.*

It can be applied directly or indirectly—in large, medium or small quantities.

It is capable of *exact* regulation. Think what this means in welding, brazing, vulcanizing—in the hundreds of industrial lines in which

Gas is the Ideal Fuel

For that special job, that rush order, when your whole plant must be taxed to the utmost, have you considered the advantages to be derived from the use of Gas?

Talk over your industrial problems with our special representative. Telephone ..... It will cost you nothing, and it may be—to our mutual benefit.

(Your Name and Address)

McJunkin Industrial Idea.

Windy City this month. The advertising department of this company has a happy faculty for bringing out attractive copy on "out of the ordinary" appliances and is one of the few units in the industry that seem alert to the advantages of the newer developments in the game, such as composite ranges, incinerators and the like.

The Consolidated Gas Co., of New York, has opened briskly with gas heater publicity. The advertising writers have taken the high prices of coal as their major text and are preaching the doctrine of gas economy under prevailing conditions. It is an example of timely advertising that should be given careful consideration by all gas interests.

Gas Heaters Are Necessities

COAL dealers expect another "sharp rise" in the price of domestic coal. They are quoted as saying that "New York City is face to face" with an anthracite coal shortage.

The mercury in the thermometer has been hovering around the zero mark.

Provide yourself to-day with a

GAS HEATER or A GAS STEAM RADIATOR

Either type will heat your Rooms, Office or Store at a minimum of expense for fuel. Gas Heaters are made in various designs, and we sell them for $1.50 and upward, including odorless tubing that can only be detached through effort on your part. A Heater burns a trifling amount of Gas, but radiates its heat instantly.

The Gas Steam Radiators are made in various sizes, and may be connected with the steam service pipes in your building thus permitting you to generate steam by Gas or not as suits your pleasure. Call at any Manhattan or Bronx Gas office to-day.

"The Right Way Is The Gas Way"

Consolidated Gas Company of New York

GEO. B. COSTELLOW, President

Heaters Featured in New York.

Timely topics are discussed in the advertising copy of the larger gas companies this fall, as usual. In Grand Rapids the company has been engaged all summer and a part of autumn in advising housewives of the advantages of the gas range in preserving and conserving. The specimen display advertisement shown herewith was one of the earlier pieces of copy, but it has an appeal for the family even yet. "No wonder Dad and Jack look pleased," is a phrase that acturately depicts the situation in about a million or more American homes just now—the homes that are provided, as the picture shows, with jams, jellies and canned fruits of all kinds. The woman who used the gas range for this sort of work will read every word of praise that is printed on the subject, of course; the woman who didn't—well, she's the lady it all aimed at and the cumulative effect will win her eventually, we know.

The recipe given below was prepared by an experienced housekeeper and has been thoroughly tested.

No Wonder Dad and Jack Look Pleased!

THERE'S no food shortage here. Lots of goodies put up for the coming winter. Jams, jellies and preserves of every kind put up with the very minimum of labor and expense on the Cabinet Gas Range.

A Cabinet Gas Range Is Mother's Aid

It makes preserving so easy results are always satisfactory. Here is one of her best recipes for canning strawberries

"Stem and rinse the fruit until quite clean. Put one teacupful of water, one pound of fruit and one-half pound of sugar into the preserving pan. Bring gradually to boiling point and simmer (i. e. boil extremely slowly) for 20 minutes on the Gas Range. Remove the berries only with a perforated spoon, and place them in warmed jars. Boil the juice a few minutes longer (5 minutes) and fill up the jars sealing them at once while hot."

If you want good jams and jells, you must order your Gas Range NOW, or the canning season will be here.

EASY TERMS

GAS COMPANY

CITZ. 4321. BELL M. 637

A Grand Rapids Display.

Prices Go Up 20% Next Week!

THE big increase in manufacturers' cost compels us to raise the price on all styles of Composite Gas Ranges approximately 20%. Present prices hold good for this week only—Oct. 8th to Oct. 13th. Buying this week will mean a saving for you of one-fifth.

Composite Gas Ranges

combine all that is best in gas ranges, and are built according to our own specifications by eight leading range manufacturers. They are scientifically tested in our own laboratory before they are put on sale to make sure that we offer only appliances that will give entire satisfaction. Each range has a self-lighter and will be delivered, connected and adjusted, *Free.*

This Notice is FINAL—Higher Prices Go Into Effect Monday, October 15

To take advantage of our present catalog prices you must purchase this week—October 8th to 13th, inclusive. You can pay in monthly installments on the same easy terms as heretofore. See them and buy them at our big showrooms downtown or any of our thirteen branch stores

The Peoples Gas Light & Coke Company
Peoples Gas Building Telephone Wabash 6000

WEST SIDE	NORTH SIDE	SOUTH SIDE
2142 W. Madison St	3059-71 Lincoln Ave.	721 West 63rd Street
1709 W. 12th Street	3043 Irving Park Blvd	3638 Archer Avenue
3641 Milwaukee Ave.	455 W. North Ave.	3834-6 E. 35th Street
3321 Darlan Avenue		3864 Commercial Ave.
4852 W. Madison St		1305 Michigan Ave.

Chicago Advertises Composite Ranges.

The McJunkin copy service has put out a very attractive industrial gas advertisement to the McJunkin customers. It is one of the few really important displays we have seen during the past two weeks, and it should awaken a wide interest in gas fuel wherever it is presented in appropriate space and environment. The idea that gas is the only flexible fuel is essential to circulate in these days of rush jobs in the industrial world and the text cannot be too strongly preached by the gas company advertising department.

Here's a good line from Beaumont, Texas: "All fuels fluctuate in price according to the supply and demand—EXCEPT GAS."

OPINIONS *AND* COMMENTS

MODERN MACHINERY.

At this juncture there are two highly essential factors in the industry of gas making that ought to be foremost in the calculations of every manager and engineer in the business. They are:

WASTE IN THE PRODUCTION OF GAS, INCLUDING WASTE OF MATERIAL, TIME AND ENERGY.

THE IMPERATIVE NEED OF THE NATIONAL GOVERNMENT FOR THE BY-PRODUCTS OF GAS MAKING, AND OF CONSERVATION OF RAW MATERIALS.

Waste in gas making is largely due, of course, to worn out or obsolete machinery and apparatus. The number of gas companies in this country that practice a policy of installing modern machinery and methods to reduce cost of manufacture and thereby meet the continual advance in the cost of raw materials is not large. The majority make the best of antiquated plant equipment and continue, in the old uneconomical ways, to waste—and to worry about the increase in costs. It is one of the mysteries of the industry that this condition continues in the face of present conditions, when so many modern ways and means are at hand to relieve the pressure.

We are confronted daily with the government's earnest appeals to conserve in raw materials, particularly those that enter in the manufacture of gas. There is also the daily repeated statements from Washington that the present rate of manufacture of by-products of gas making will not meet the actual necessities of the munitions factories by one-half. We are also faced with the grave problem of increased costs in raw materials. There is really little need for stating these facts, since every man in the industry is thoroughly familiar with each phase of the situation.

Modern machinery and methods will aid in the solution of all these problems.

What have you done, Mr. Manager, and you, Mr. Engineer, to curtail waste of material, time and energy in the production of gas in your plant this year or next year?

What have you done to assist the government in the conservation of raw materials in the manufacture of gas and the distribution of same?

Have you investigated the field of modern machinery, methods and apparatus with a view to installing economical equipment in your plant? Every element in this field is eager to co-operate with you at a moment's notice.

Consider these questions well and at once.

Your company, your industry, your country depends upon you for action in this respect—prompt action—today.

Did you know someone had been appointed to watch you in order to make you conserve food and other materials? Yes—yourself!

ONE ASSOCIATION.

News from New York, where the recent meeting of the Manufacturers' Section, N. C. G. A., took place, indicates that an early amalgamation of the American Gas Institute and the National Commercial Gas Association may be expected. The action that clearly points to this desirable consummation was the re-election of present officers of the section with the understanding that amalgamation is so near at hand these officers were best retained in order to handle the section's affairs in the big movement.

It has been known for some time that a plan agreeable to representatives of both national associations had been worked out and fully approved. Details of this plan have been published in THE GAS RECORD. It now remains for the plan to be put into active operation by the directors of the two bodies, and then will come the formal action by the associations, either in convention or by mailed voting, it is to be assumed; and then the job is done. The single national association, representing all departments of the gas industry, and without that duplication of effort that has prevailed in two organizations in the past, will come into existence.

Perhaps we may be pardoned for again making brief mention of the fact that THE GAS RECORD, single handed and alone among the gas publications, has earnestly advocated and consistently promoted this amalgamation from the birth of the idea up to the present time. We are proud of our participation in a movement that means so much in the progress and advancement of gas interests.

A lot of the worries and much of the waste connected with the operation of your plant under present conditions may be eliminated by the substitution of modern apparatus for the antique methods you now employ.

UNNATURAL GAS.

The Israelite
In Bible day,
Sat down and wept
In his dismay
When Pharaoh
Put out a law
He must make bricks
Without the straw.
But we are deeper
In the hole;
We must make gas
Without the coal!

—Advance News.

The GAS RECORD

MONADNOCK BLOCK, CHICAGO, U. S. A.

W. H. Graffis . . . . . *President*
H. D. Fargo . . . . . *Vice-President*
H. B. McMeal . . . . . *Secretary*
Herbert Graffis . *Treas. and Adv. Manager*
Milt Saul . . . . . *Vice-Pres. and Editor*
Walter V. Turner . . . *Technical Editor*

SUBSCRIPTIONS

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ADVERTISING

THE GAS RECORD is issued the 2nd and 4th Wednesdays of each month. Copy can be accepted as late as the Monday previous to each issue. Where proof must be seen, allow ample time for transmission in the mails.

	Yearly Rate 24 issues	6 mos. Rate 12 issues	3 mos. Rate 6 issues	Less than 6 issues
Full Page, per issue . . . . :	$40.00	$46.50	$50.00	$54.00
Half Page, per issue	22.00	25.00	27.00	29.00
Fourth Page, per issue . . .	12.00	14.50	16.00	18.00
Eighth Page, per issue . . .	7.00	8.00	9.00	10.00
Sixteenth Page, per issue .	4.00	4.50	5.00	6.00

Classified Advertising — "Wants," "For Sales," etc.—5 cents a word per insertion, minimum charge $1.

Entered as second-class matter at the post office at Chicago, Illinois, under the act of March 3, 1879.

Vol. 12 No. 8 **CHICAGO** October 24 1917

Effect of Storage on Properties of Bituminous Coal.

A series of experiments, started in 1910, to determine the effects of storage upon the properties of bituminous coal has recently been completed by the Engineering Experiment Station of the University of Illinois. The object has been to devise methods of storing which will avoid the risk of spontaneous combustion and to determine the extent to which coal deteriorates in storage.

Professor S. W. Parr, under whose direction the tests have been conducted, summarizes the results in bulletin 97 of the Engineering Experiment Station. It is shown that, if properly sized and carefully handled, coal may be stored without danger of spontaneous combustion; that the actual loss of heat value, or deterioration, resulting from storage is slight; and that underwater storage eliminates entirely all risk of spontaneous combustion or of deterioration. The extent of the waste and economic loss incident to the present method of seasonal production, with its attendant abnormal demands upon transportation facilities, is discussed, and it is estimated that the lack of storage facilities in large distributing centers necessitates a capital investment in mines and railroad cars of $500 000,000 in excess of the amount which would be required if production could be maintained at a uniform rate throughout the year. Copies of bulletin 97 may be had without charge by addressing C. R. Richards, Director of the Engineering Experiment Station, University of Illinois, Urbana, Ill.

Natural Gas Well Struck Near Birmingham, Ala.

The bringing in of a 400,000 cu, ft. per day natural gas well on Aldrich dome, eight miles south of Birmingham, Ala., is regarded as one of the most important events in Birmingham's history. Further attempts were made to drill into the gas sand, but difficulties were experienced because of the high gas pressure, which made it impossible to keep any water in the drill hole to cool the tools. At 230 feet the drillers barely touched the gas sand, and the officers of the Gulf Producing company want to go about 10 feet further with the present hole. These officials are confident the Aldrich dome is one of the bonanzas of the country and are proceeding accordingly. They base all their anticipations on the perfection of the dome and its sealed character.

Converting Brass Furnace from Oil To Gas Fuel.

A simple arrangement for converting a crucible brass melting furnace from coke or oil to gas fuel is shown in the accompanying sketch. The nozzle at A is a 3-in. by 2-in. reducer. This installation illustrates the utilization of surplus heat in preheating of metals using the discarded crucible as a container.

CHICAGO'S PLIGHT.

President Cowdery Tells Fuel Administrator a Shortage Threatens.

Unless the federal fuel administration can come to the relief of the Peoples Gas Light & Coke Co., of Chicago in the immediate future, Chicago's gas supply is to be reduced by 30,000,000 to 50,000,000 feet of gas a day. This declaration was made in Washington last week by E. G. Cowdery, president of the Peoples company, who conferred with officials of the fuel administration appealing for relief from fuel shortage which the company faces. E. A. Snead, in charge of distribution for the fuel administration promised to see that the company gets 10,000 tons of anthracite coal and 19,000 tons of high grade coke a month, but advised the company to use by-product coke, which is made in Chicago, to make up the rest of the necessary supply.

"If we get the amount of fuel promised we still will be short about 16,000 tons a month to manufacture the gas supply which Chicago will need in the winter months," said Mr. Cowdery. "We cannot use by-product coke successfully for making gas. It makes clinkers and clogs up our furnaces. What we need most is high grade coke. We have contracted for large amounts, but contractors are falling down on deliveries. Even with anthracite we cannot make as much gas as we can with coke. Unless we can get more assurances than we were able to get from the fuel administration, there is certain to be a gas shortage. And if we don't get all the fuel administration promises us now the shortage will be serious. We will be able to run from now until the middle of November on the fuel supply we have and are sure of. After that we are dependent upon what the government may be able to do for us."

HOW'S YOUR COAL?

THE GAS RECORD would appreciate reports from gas companies on their present and prospective supplies of coal and other gas making supplies. It will advance the general interests of the industry if these reports are published collectively and made available for presentation to the fuel administration at Washington.

The appointment of Burwell S. Cutler, of Buffalo, as chief of the Bureau of Foreign and Domestic Commerce, Department of Commerce, has been confirmed by the Senate. Mr. Cutler was born in Buffalo and finished his scholastic education at Lake Forest University and Harvard. For fifteen years he has been president of an important Buffalo manufacturing concern and has been identified in an official capacity with numerous business houses and civic organizations.

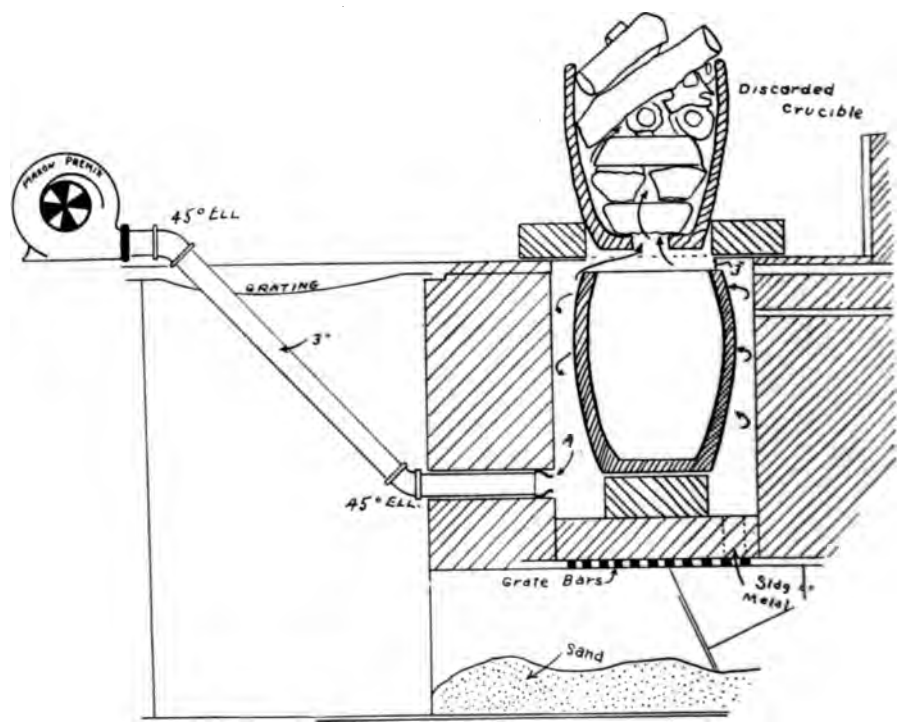


Diagram Showing Crucible Brass Melting Furnace Converted to Gas Fuel.

When Rate Is Confiscatory

Then Is Only Time Interstate Law Applies to Natural Gas—So Rules New York Commission —President Also May Control Under Food Act

A very interesting and important decision has just been handed down by the Public Service Commission for the second district of New York, in the complaint of Alfred C. Davis and others, of Jamestown, against the Pennsylvania Gas Co. as to the price of natural gas charged private consumers (Case No. 6040). It is held that, although the flow of natural gas from one state to another through a pipe line is interstate commerce, the commission has the power to fix a reasonable rate for its sale, until Congress assumes jurisdiction of the matter. In the matter of commerce between states, the same inference is not always to be drawn from the absence of congressional legislation, says the commission, as might be in the case of commerce with foreign nations. A demurrer to a petition asking that the price of natural gas be reduced will be overruled, according to the commission when the basis of the demurrer is the claim that the commission has not jurisdiction because the gas is piped across the state line.

The defendant in this case rested its contention to a great extent upon the case of Landon, as receiver of the Kansas Natural Gas Co., against the Public Utilities Commission of Kansas and others, decided by the District Court of the United States for the District of Kansas on April 21, 1917, and argued that the decision in that case must lead the New York commission to sustain the demurrer. The question before the New York commission was held, however, to come under sections 71 and 72 of the Public Service Commissions Law, giving jurisdiction to fix by order, within lawful limits, the maximum price which the defendant may charge the complainants for gas furnished to them. The term "lawful" means as much a fair and reasonable return for the service rendered as it does a price named in some statute. In the Landon case, the judge said: "It must be borne in mind that this suit is not one for the fixing of a rate to be charged by the plaintiffs for natural gas, but it is a suit to determine whether the 28-cent rate already fixed by the commission is confiscatory," and later, "It is accordingly held that the 28-cent rate is not and will not be compensatory, but, on the contrary, that it is unreasonably low and confiscatory, and violative of the Constitution of the United States." The four separate findings of the court in the Landon case were based upon the conclusion that the rates involved were either non-compensatory, unreasonably low, and confiscatory, or were an attempt directly and unduly to burden and regulate interstate commerce. The court further declared that if the rate was not confiscatory the method adopted by the commission would be immaterial.

Continuing, the New York commissions says: Nowhere in the Landon case is it held, nor can a proper conclusion be drawn from the opinion in that case, that New York state has not a right to fix a proper price for natural gas brought from another state and sold within the borders of New York state. The complainants do not ask this commission to prohibit or to interfere with the flow of gas across the state line, or to prevent its sale within the state, or to fix a price less than that which will render a fair and reasonable profit. Not until one of those things is done, or the commission takes the prohibitive action, is the Landon case an authority against the jurisdiction of the commission to act upon the application of the petitioners. It is conceded by the petitioners that the flow of gas from one state to another through a pipe line is interstate commerce, but this fact does not prevent the state from controlling within legal limits the price at which the commodity may be sold within the limits of the state.

Regarding Interstate Commerce.

The interstate commerce law provides that the act shall not apply to the transportation by pipe lines of natural or artificial gas: section 1. Congress has thus refused to subject natural gas to the control of the Federal authorities. But this refusal does not necessarily place the control of the transportation of gas from one state to another within the control of the states. When the subject is local in its nature or sphere of operation, and can be properly regulated by special measures adapted to a particular locality, the state can act until Congress assumes control: but when the subject is national in its character and requires uniformity of regulation affecting alike all the states, Congress can alone act and provide the needed regulations. The absence of any law of Congress on the subject is equivalent to its declaration that commerce in that matter shall be free and that importation into the state shall be unrestricted. (Bowman v. Chicago Railroad Company, 125 U. S. 507; opinion of Mr. Justice Field.) The court, however, in the Bowman case, opinion of Mr. Justice Matthews, holds that in the matter of commerce between states the same inference is not always to be drawn from the absence of congressional legislation as might be in the case of commerce with foreign nations, and that the question may therefore be considered in each case as it arises; whether the fact that Congress has failed in the particular instance to provide by law a regulation of commerce among the states is conclusive of its intention that the subject shall be free from all positive regulations, or that until it positively interferes such commerce shall be left free to be dealt with by the respective states.

Intention As To Natural Gas.

Has Congress intended to leave the states affected the regulations necessary to control the trade in gas, asks the New York commission, and proceeds to answer the query in this manner: The control of this product is not one which is of interest to the whole country. The area which produces it is comparatively small. In the same sense the distance it may be conveyed with profit is short. For commercial purposes, but one method of transportation is possible—by pipe lines. The source of supply is continually changing and varies in amount. It is used for light, heat, and power under different conditions and for different purposes. In some cases, where the gas is transported a long distance, the charge for its use may be composed largely of items which arise from the cost of transportation. In the Landon case, the court calls attention to the fact that the commission in fixing a rate divided the property into two parts: namely, that used in production and that used in transportation, and then used only the valuation of the latter as a basis in determining the cost to the consumer, thus making the rate fixed a transportation rate and clearly a burden upon interstate commerce. It seems unnecessary to discuss the numerous cases in which the state has been allowed to assume the regulation of matters which concern the welfare of its citizens in the absence of congressional action, although such matters directly or indirectly affect interstate commerce. With regard to the special subject of our discussion, we find that the court in Jamieson v. Indiana Natural Gas & Oil Co. (128 Indiana 555) holds that natural gas is a local product, and that its production is confined to a limited locality; that it is a proper subject for state legislation, and that it does not require a uniform system as between the states for its regulation. In Manufacturers Light & Heat Co. v. Ott (215 Fed. Rep. 940), it is held that the fixing of rates for natural gas within the state is a proper state regulation, although the product may be produced in another state; that Congress having taken no action, it is clearly within the power of the state legislature to protect its own citizens against excessive charges. In Minnesota Rate Cases (230 U. S. 352), the court discusses the conditions under which the states may act, although the subject of their action is connected with or indirectly affects interstate commerce. It says, page 399, "It has repeatedly been declared by this court that as to those subjects which require

a general system or uniformity of regulation the power of Congress is exclusive. In other matters admitting of diversity of treatment according to the special requirements of local conditions, the states may act within their respective jurisdictions until Congress sees fit to act." Again, page 402, "It is competent for a state . . . to adopt protective measures of a reasonable character in the interest of the health, safety, morals, and welfare of its people, although interstate commerce may incidentally or indirectly be involved. . . . Where the subject is peculiarly one of local concern, and from its nature belongs to the class with which the state appropriately deals in making reasonable provision for local needs, it cannot be regarded as left to the unrestrained will of individuals because Congress has not acted."

President Can Regulate Gas.

It may be noticed that in the law recently enacted by Congress as a war measure for the control and conservation of foods and fuel, natural gas is named as one of the necessaries of life and put under the control of the President. But taking into consideration the peculiar purpose for which that act was passed, it may be said that at least until the President does act, the ordinary control of rates at which this fuel must be sold is not taken away from the commission.

Death of Alfred H. Cook Occurs at Memphis, Tenn.

The death of Alfred H. Cook occurred recently at a hospital in Memphis, Tenn., where he had been confined for some time by an attack of blood poisoning, occasioned by his stepping on a rusty nail last February. Mr. Cook formerly was floor salesman for the Citizens Gas & Fuel Co., of Terre Haute, Ind. His father, A. S. Cook, who was Mr. Shaul's predecessor as manager of the Terre Haute company, now has charge of the gas company correspondence for the A. B. Stove Co. at Battle Creek, Mich.

Charles K. Enos, who formerly represented the National Stove Co., div., in Michigan, Indiana, Kentucky and Tennessee, has been transferred to southwestern territory and will look after the company's business in Texas, Oklahoma and Louisiana. He will have his headquarters at 619 Ewing street, Dallas, Tex.

J. E. Burke, Commercial Manager for the Citizens Gas Co., Indianapolis, Ind., was in Chicago last week to see his brother, who is seriously ill and recently underwent an operation there.

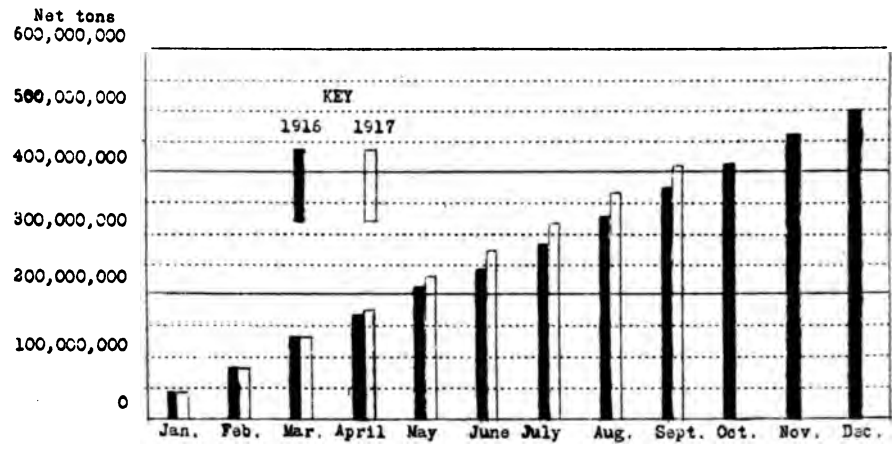
Rupert Williams, Frank Currier, Stewart Swift and Frank Baysinger, all of the Runyan-Ryall Syndicate, Rochester, Minn., have entered the military service of the nation.

COAL PRODUCTION.

Bituminous Output Ahead of Last Year Reports U. S. Geological Survey.

September production of bituminous coal (including that made into coke) is estimated at 43,573,652 net tons, according to the latest report of the U. S. Geological Survey prepared by C. E. Lesher. Although the total output was smaller in September than in August, the rate of production increased from 1,737,685 net tons per working day in August to 1,793,154 tons in September.

The total production from January 1 to September 30, 1917, was approximately 407,370,011 tons, an increase of 38,684,232 tons over the production for the corresponding nine months of 1916. The soft coal mines of the country continue to produce in excess of last year's output, but the rate of increase over the production of 1916 is slowing down. During the month of August the 1917 production gained four million tons over the corresponding 1916 production. During September the gain was only 1½ million. Expressing the same idea in terms of per cent., by the end of August the 1917 production was 11.1 per cent. ahead of that for 1916; by the end of September it was only 10.5 ahead. It seems increasingly probable that the total production of the year 1917 will better the record of last year by not more than ten per cent.



Comparative Total Production in 1916 and 1917 of Bituminous Coal

Improvement Made in Port Arthur Plant.

Work on the improvements at the plant of the Port Arthur (Tex.) Gas & Power Co. is progressing very satisfactorily. The big reserve gas tank which is under construction is about two-thirds complete. It is expected that the improved plant will be in operation by November 15.

Continuous Process for Making Water Gas.

A continuous process of making water gas is proposed by Aqvist and Helsing, in which steam unmixed with air is passed downwards through incandescent fuel, says the London Gas World. The water gas formed passes out through an opening in the side of the producer just above the grate. Above this outlet, two horizontal electrodes are introduced into the producer at opposite sides, so that the temperature of the charge can be maintained electrically. The necessity for "blowing" is thus obviated and the gas is free from nitrogen.

Much Work Planned for New Gas Plant.

The gas company recently granted a franchise in Thief River Falls, N. D., expects to start work in their gas house within the next ten days. It is planned to excavate the pit for the gas holder before the frost interferes. The machinery may then be shipped in during the winter and the tank built early in the spring. It is now planned on having the plant ready by July 1 next.

New Water Gas Plant May Be Built in Iowa.

The Iowa Railway and Light Co. may build a water gas plant at Marshalltown. An engineer, who has been investigating the coal gas plant, has made his report to the company, the officers of which are considering the advisability of the expenditure. The water gas plant, if built, could be put in operation in a year, and it would be an auxiliary to the old plant to produce gas enough, when operated in connection with the coal plant, to supply largely increased consumption. The gas coal situation, which does not promise to be put on an easy basis for months, and the necessity for enlarging the capacity for gas production, has made the company turn to the possibility of erecting a water gas plant. The investment in a complete water gas plant would probably be $50,000.

In England and Germany

Latest British Development Is a Big Demand for Heating Gas, While in Germany the Government Takes Charge of All the Plants in the Empire

The effect of the war on the gas industry in England and Germany is now clearly defined. While definite statistics are not available to show consolidated results, there are certain activities on the part of the two national governments that indicate not only the pressure under which the industry in those countries proceeds but at the same time reveal the close relation of the gas industry to the war energies of the nations.

In England the latest development of the war situation in its relation to gas is a growing public demand for heating gas, according to the "Gas Journal" of London. The government's decree against all public lighting after dark of course acts as a tremendous restriction on lighting gas, but this is more than offset by the demand for gas as a house-heating fuel, and there is therefore an increase in consumption. Coal is scarce; the Ministry of Munitions has advised the nation that the by-products of coal are necessary in the manufacture of munitions and that gas should be used wherever possible; and there is a general conservation of the coal supply, as can be seen in the analysis of the situation made by the editor of the "Gas Journal," printed below.

In Germany the government in July took charge of all gas plants, "confidential officers" from the war department now being posted at every gas works. Orders prohibiting gas consumption above a certain quantity fixed by the government have been promulgated, and the use of gas through certain appliances is prohibited. Practically all commercial gas activities have ceased, and the supply furnished by the German plants evidently is devoted to actual necessities, even that used in the munitions plants. This unique situation of course is due to the shortage of fuels and other supplies throughout the German empire.

The following articles are taken from the "Gas Journal," the reprints from the "Vossiche Zeitung" having been translated, it is explained, by a friend of the British editor.

England's Demand for Heating Gas. (*From British "Gas Journal," Aug. 14.*)

Last half-year's trading of gas undertakings supplies such a long arm to the industry's "direction-post" that it is impossible to miss it. The difficulties with coal supplies and the severity of the weather caused a big draft on the mains of gas undertakings everywhere; and as the half-year's accounts begin to flow in, we see this represented in substantial percentage increases in the sales. Illustrative is the South Suburban Gas Co.; and at the meeting of the proprietors held recently, Charles Hunt (the chairman) pointed to the lesson of these increases. The company's half-year's increase was 17.1 per cent. Where did this increase come from? The records of the thermometer and a figure that Mr. Hunt gives tell that lighting had no part in it, but that the shrinkage in lighting consumption promoted by the government regulation was made up and the additional sale of 17½ per cent. was occasioned by heating use alone. The figure to which we refer is the 15.9 per cent. by which the sales of gas increased in the midsummer quarter alone, which period was entirely covered all but a week by the summer time act; a large proportion of the increase being contributed by ordinary meter consumers as distinguished from the prepayment ones. These facts are important in the educative work that has to be carried on. We have to foster the idea that it is "heating" gas and not "lighting" gas that is required, and to make it known that the percentage of suitable and readily aerated combustibles in the gas is as important as calories.

There was reference by Mr. Hunt to the non-success of the company in approaching the board of trade with the request that their calorific standard of 475 B. t. u. should now apply to the one-fourth of the area to which through the obstructive tactics of ignorance in these matters, the illuminating standard still applies. He remarked upon the tenacity with which the board of trade are clinging to the 500 B. t. u. standard, as though there was some particular virtue in the figure, and was the "end-all" of the question of a suitable gas. We may expect something else when the scientific aspects of the matter are known in government circles. But we cannot wholly blame the board for declining to shift their ground until properly enlightened. When it is realized how slow the gas industry has been to appreciate that calorific power is not everything, and that an inordinate amount of inert constituents in gas, or a quality of gas which—requiring a large amount of air for complete combustion—compels the introduction of an excessive amount of flame temperature impairing nitrogen into it, is not the best for the consumer, we must forgive the board of trade for not realizing these things at first blush. We hope the enlightenment will come via the board of fuel research, and in good time consistent with thorough investigation.

The South Suburban Co. under the stimulus of the lessons of the war, and the development of plans for new riverside works, were among the first to turn attention to this question of gas composition; and this is not surprising in view of the active and practical part that Mr. Hunt has taken in opposing the saddling of the industry with high calorific standards. His old beliefs on the subject have only been hardened by the lessons of the war; and this is seen by certain passages in his address to the proprietors of the company, the full depth of the meaning of which, it does not require any great power of penetration to discover.

"It may be safely said," he remarked, "that a return to pre-war conditions in their entirety is out of the question, because this would not be compatible with the fullest conservation of the nation's fuel resources, which it must henceforth be the aim of everyone to promote. The war has taught us many things; and it would be the height of unwisdom to ignore its lessons." Then on the question of inert gases, Mr. Hunt added: "Our investigations have already convinced us that the presence of these gases in the gas as delivered to the consumers, in so far as this is preventible under the ordinary conditions of carbonization, is prejudicial to both buyer and seller. Accordingly, the utmost is being done to limit their presence as much as possible, and such limitation to the greatest practicable extent will be kept steadily in view as one of the aims of the new carbonizing plant which, so far as can be foreseen, will have to be provided immediately after the war."

The fullest conservation of the nation's fuel resources means the utilization of coal in such a way or ways that its valuable constituents are not lost, and at the same time there shall not be

over-production of the major constituents. These conditions require that the destructive burning of bituminous coal shall cease within economic bounds, that it shall be restricted by the utilization of coke within practicable limits for gas making—thus, it is expected investigation will show, furnishing a mixed gas of good percentage combustible composition, and at the same time helping to keep the secondary products nearer to the lines of absorption than would be the case if coal were entirely used for gas making under the prospective conditions of gaseous fuel demand. For the gas industry the lessons of the war are of fertile character.

German Government Takes Charge.

(*From the "Vossiche Zeitung," July* 31.)

The government commissioner for electricity and gas (Prof. W. Kübler) has issued, under the date of the 26th inst., a lengthy ordinance in order to secure the undisturbed operation of the gas works. By this, one or more confidential officers will be appointed by the competent war office authorities to every gas works according to size.

New house connections, new main-laying, and the installation of bath gas-heaters and ordinary heating stoves are forbidden.

In extraordinary pressing cases, and in installations up to 100-light meters, the confidential officer appointed to the gas works is authorized, under reservation of the right of revocations, to allow exceptions so long as the capacity of the gas works is not thereby prejudiced.

In the case of connections which do not come within the four corners of this authorization, special permission is necessary, and application must be made to the competent war office authorities.

The extent of the limitation of the total gas supply will be fixed for the time being by the government commissioner. For each individual works it will be computed on a uniform technical basis. The public lighting is to be kept down to its utmost limits.

The confidential officers are empowered to prohibit the use of ordinary gas heating stoves.

The sale of gas shall until further notice be so regulated that consumers who have used gas the previous year shall from now—month by month or in the usual period between meter readings—obtain a total of not more than 80 per cent. of their past year's consumption.

If since last year the calorific power of the gas has altered in a demonstrable manner, then the 80 per cent. limitation will be decreased or increased in like proportion.

The limitation applies equally to war work.

Conditions of exception may in general only be granted subject to revocation for the fulfillment of immediate war requirements, for communal kitchens, hospitals, railways, and water works, and then first of all only to the first of October of this year.

The use of gas in excess of the quantity for the month allowed to the consumers is to be prevented in the most rigorous manner.

In the case of excessive use, the consumer will have to pay to the gas works a surcharge of 50 pfg. per cubic metre [$3.40 per 1,000 cu. ft.]. In special cases this surcharge may be increased.

(*From the Evening Edition "Vossiche Zeitung," July* 31.)

The managers of the gas works of Greater Berlin have already readily accepted the decree of the government commissioner for gas and electricity, published in this morning's issue, and have drawn up the conditions which will apply to their districts.

The government commissioner, who will give the responsible gas engineer every facility to take local circumstances into account, has raised no objection to these conditions; but they will require the consent of the town council before they are published and come into force, which may be before the end of this week.

The decree of the government commissioners was necessary in order to limit the use of coal, and to insure the production of gas for some time to come.

The managers of Greater Berlin's gas works were of opinion that all must exert themselves as much as possible to meet the difficulties. Of course, they have no desire whatever to make the supply of gas difficult for long duration.

In consequence of the absence of oversea petroleum, a large number (especially of small households) have taken to the use of gas; and it is clearly in the interest of the producers of gas —indeed, in the interest of the state, to whom it cannot be a matter of indifference if we have in future to spend several millions on American petroleum —not to scare away these new consumers of gas.

The gas consumers would, therefore, do well to apply in all doubtful cases to the gas works, who assuredly will not without necessity do anything to harm their consumers or create needless difficulties for them. On the contrary, they will consider it their principal duty to act as mediator without making the community and the interests of individuals suffer.

That a speedy intervention is necessary, is shown by the arbitrary stoppage of central hot water supplies which have caused the gas consumption, already seriously high, to jump up by about 50 per cent.

TO VOTE ON RATES.

Port Huron Citizens on Oct. 29th Will Settle Question of Increased Rates.

An interesting rate situation has arisen in Port Huron, Mich. The Port Huron Gas & Electric Co., hard hit by the rising costs of raw materials in gas manufacture, recently asked the city commission for permission to raise its rates 15 cents per 1,000 cu. ft. The commission, on legal advice, replied that it had no authority to permit the raise in rates, but suggested a popular election on the question. This suggestion was adopted and on Oct. 29th, when the primary election is held, the voters of Port Huron will decide by vote this question:

B. J. Crahan.

"Shall the Port Huron Gas & Electric Co. be permitted to raise the price of gas 15 cents per thousand cubic feet from Nov. 1, 1917 to Sept. 1, 1918?"

A vigorous campaign of education has been carried on in local newspapers by the gas company, including the usual controversies with public officials who question the necessity for the raise in rates, and Manager B. J. Crahan has steadily developed a rising tide of public sentiment in favor of the gas company's request. He is using every legitimate means to acquaint his consumers with the gravity of the situation, including gas bill stickers, personal letters and public statements.

Manager Crahan's long experience in the gas business eminently fits him to carry on successfully a campaign of this nature, for he knows the golden rule of playing fair with his public. He was born late in the 60's and for the first nineteen years of his life resided at Fulton, New York. During this period he slid through the regular grammar and High School grades, and then, developing the spirit of thoroughness which has since marked his work, he buckled in and graduated with high honors from Falley Seminary. The next move was to cash in on some of the knowledge he had absorbed from books and fate landed him in Memphis where he found himself working as a blacksmith's helper in the C. & O. railway shops. Ten months of swinging a sledge rubbed the rough corners off the student and then he broke into his life work and the gas business by taking an eighteen months' course in meter reading with the Memphis Gas Co. A lot of first hand experience on underground pipe and construction work was gained by putting in a year with the New York Central's water filling station contractors at Rochester, N. Y., after which he went with the Detroit Gas Light Co., where he started in at the works in 1889 to gain a practical knowledge of gas manufacture. In 1892 he was moved to the shop department where he picked up a lot of odds and ends of useful information by reading meters seven hours a day and chasing trouble for recreation, during the other seventeen.

Promotion was earned in those days and foremen were not picked, educated and turned out as a finished product in a year, but in 1898 his resourcefulness and ability, or more likely his dependability were recognized by calling him in and making him assistant shop foreman. After this things happened faster and in two years he became shop foreman and then it was up to him to see that thousands of meters were set, removed, repaired and repainted, tested, read and generally kept on the job.

In nineteen five he became superintendent of the Portsmouth Gas Co., at Portsmouth, Ohio, where in 1906 Mr. Crahan introduced natural gas from the West Virginia field and shut down his works. Three years later The National Gas, Electric Light & Power Co. wanted a man of proven worth to handle a situation requiring more than ordinary tact and ability as superintendent of its natural gas property at Joplin, Missouri. Once more Mr. Crahan's faculty for making friends combined with his record as a trained executive and exceptional organizer, proved that no mistake was made in sending him to the state where the people have to be shown. After eight years in Joplin Mr. Crahan, on August 1st, 1917, succeeded J. C. Sloan as manager of the Port Huron Gas & Electric Co., of Port Huron. Mr. Crahan was married in 1893 and has four boys and three girls at home while the oldest son is serving his country and winning promotion, in the army at Fort Bliss, Texas, and incidentally he is proving that the Crahan method of getting things by working for them, can be applied in military as well as in civil life.

Patriotic Window of St. Clair County G. & E. Co.

The recent window trim of the St. Clair County Gas & Electric Co. at East St. Louis, Ill., is one of the best patriotic displays of the season. It has the Statue of Liberty as its central idea with attractive settings and decorations. The accompanying illustration is a reproduction of this window. It created a great deal of favorable comment on the part of the public while it was on display.

MANUFACTURERS SECTION.

Members in New York Meeting Look Forward to New Association.

At the meeting of the Manufacturers' Section, N. C. G. A., held at the McAlpin hotel, New York, Oct. 16th, the following firms were represented: George M. Clark & Co., Bayley & Sons, Inc., Sprague Meter Co., Superior Meter Co., Strause Gas Iron Co., Crane Co., Chicago; Weir Stove Co., William M. Crane & Co., Union Stove Works, Baltimore Enamel & Novelty Co., Detroit Stove Works, Michigan Stove Co., Nightingale Co., Pittsburg Water Heater Co., Roberts & Mander Stove Co., John J. Griffin & Co., Roberts Brass Co., Welsbach Co., Union Steel Products Co., L. Stotz, Secretary, N. C. G. A.

At the opening of the meeting President H. D. Schall read a report which was accepted. The differential rate committee, H. D. Schall, chairman, read a report which was accepted. In the report of the committee a paragraph was read wherein Mr. Owens recommended the 20,000-pound minimum 5th class rate of freight on gas stoves. It was moved, seconded and carried, that said rating be recommended by this section.

The nominating committee reported that inasmuch as the formation of the new association would be perfected within the next few months, it was recommended by the nominating committee that the present officers be continued until the formation of the new association. On motion, seconded and carried, the recommendation was accepted and the officers were considered re-elected for the balance of the term.

Exhibition committee report was read and accepted. Advisory committee to Bureau of Standards report was read and accepted. Advisory committee to Board of Control report was read and accepted. Membership committee, William M. Crane, chairman, report was read and accepted. Report from the committee "Council for National Defense," H. D. Schall, chairman, was read and accepted.

W. Griffin Gribbel, reporting for the paper committee, stated that inasmuch as a composite paper without discussion was far from interesting, no effort was made towards the preparation of a paper this year. Subject was allowed by the committee to remain open pending the formation of the new association, whereby the Manufacturers' Section could prepare the paper on "Improved Merchandising Methods."

The secretary's report was read and accepted. The treasurer's report was read and accepted. The following firms were elected to membership in the sec-

Patriotic Window by St. Clair County Gas and Electric Co.

tion: THE GAS RECORD, Titeflex Metal Hose Corp., Crane Co., American Gas Construction Co., The Gas Age, American Cast Iron Pipe Co., Maxon Premix Burner Co., Connelly Iron Sponge & Governor Co., The Union Steel Products Co., The Gas Industry, Baltimore Enamel & Novelty Co., National Machine Works, Young Bros. Co., Hugo Manufacturing Co., The Fuller Warren Co., American Gas Engineering Co., Cribben & Sexton Co., Johnson Gas Appliance Co. (reinstated).

The following firms' resignations as members of the Manufacturers' Section were accepted: Lezius Automatic Draft Regulator Co., Remington Typewriter Co., Hale & Kilburn Co., Michigan Gas Appliance Co.

On motion of William M. Crane, seconded and carried, the Manufacturers' Section was to carry an Honor Roll to comprise the names of those members in the section who had enlisted for service abroad. The following names were suggested: Russell E. Sard, Albany, N. Y.; W. Griffin Gribbel, Philadelphia, Pa.; John W. Calder, Esq., Utica, N. Y. All members were requested to notify the secretary of any members who had enlisted in order that their names might be enrolled on the Honor Roll of the section. On motion, seconded and carried, the treasurer was authorized to invest in the second Liberty Loan bond a sum not exceeding $1,000. The amount, however, to be left to the Board of Control. On motion, seconded and carried, the secretary was authorized to purchase fobs for the treasurer and secretary, the same style as presented to the past presidents. It was moved, seconded and carried, that the authorization to dispose of the pipes and flags now in storage in Washington be reconsidered. This motion was made to separate the pipes and flags, in order that some disposal might be made of them. It was moved, seconded and carried that the flags now in storage in Washington be donated to the Red Cross and the pipe to be sold by the following committee, appointed by the chair: William M. Crane, Mr. Plucker, of the Isaac Sheppard & Co., Mr. Oswald, Crane Company of Chicago. On motion, the meeting adjourned.

Madison (Ind.) Light & Fuel Co. Wins Humphrey Prize.

Through error on page 24 of THE GAS RECORD for October 10th, one of the prizes awarded for fine window displays of Humphrey water heaters was announced as given the Madison (Wis.) Light & Fuel Co. The Madison (Ind.) Gas Co. was the one which captured this honor.

THE MARKETS

Coal Gas By-Products Strong—Sharp Price Cut on Cast Iron Pipe.

The government has decided that owing to the scarcity of toluol for making trinitrotoluol, substitutes will have to be relied on to a growing extent, and one of the chief moves in this direction will be the use of picric acid instead of trinitrotoluol. While nothing yet has been done in the letting of actual contracts, the government expects to take care of large additional high explosives raw material requirements through the new nitrating plant to be erected shortly, and for which the Stone & Webster Engineering Corporation, Boston, now is taking bids. By-product quotations at present range as follows:

Pure benzol, spot, per gallon at producers plant 49 to 53 cents; toluol, $1.70 to $1.80; solvent naphtha, 17 to 20 cents.

Per pound at producers plant, phenol, 45 cents.

Per 100 pounds at seaboard, sulphate of ammonia, $4.90 to $5.05.

Contract. Per gallon at producers plant, pure benzol, 49 to 53 cents; toluol, $1.50 to $1.80; solvent naphtha, 17 to 20 cents.

Per pound at producers plant, phenol (nominal), 43 to 45 cents.

Per 100 pounds at seaboard, sulphate of ammonia, nominal.

Creosote oil, 25 per cent., gallon 33 to 35 cents; drip oil, 20 per cent., gallon 29 to 30 cents; pitch, various grades, ton, $8.00 to $20.00; carbolic acid, crude, 95-97 per cent.; pounds, $1.05 to $1.10; carbolic acid, crude, 50 per cent.; pound, 60 to 65 cents; carbolic acid, crude, 25 per cent., pounds, 32 to 35 cents; creosol, U. S. P., pound, 19 to 20 cents.

Cast Iron Pipe Reduced $15 Per Ton.

Since the establishment of coke and pig iron prices at new government levels, cast iron pipe makers generally have adopted a lower figure on their product. New York cut approximately $9 per ton, the new level being $56.50, New York, on 6-inch, class B, and $59.50, New York, on 4-inch, class B. Although it is reported that the navy department is taking bids on 150,000 feet of cast iron pipe for Norfolk, 1,600 feet for Puget Sound, and 18,160 feet for various other navy yards, this business has not yet come through. Birmingham, Ala., reports that while cast iron pipe prices have been reduced $15 per ton, to $45 per ton for 6-inch, there is no lowering of operations at the various plants in that district. Nor has any demand thus far been stimulated.

Coke Operators and Brokers in Air.

Pittsburgh coke operators, except in rare instances, continue their refusal to accept new business at the government figure of $6, ovens, asserting that full operations are necessary to take care of existing contracts. Coke brokers hope the fuel administration soon will announce whether or not commissions will be allowed above the $6 price, or if it will be paid from that figure by the coke operators.

U. G. I. PROSPERS.

Pres. Bodine Says Dividend Was Earned in Nine Months of 1917.

In the first nine months of this year the United Gas Improvement Co. of Philadelphia earned its full year's dividend on the capital stock, with a margin to spare. Samuel T. Bodine, the president, made known this fact recently. He also declared that the company's business was never better, but, like all other public utilities, U. G. I. has had to contend with the excessive cost of raw materials and the higher scale of wages, which have had some effect on profits.

"Fortunately," said Mr. Bodine, "we were able to negotiate contracts for oil for our larger companies when it was much cheaper, and in this respect we are perhaps better off than some of the other companies engaged in similar enterprise. This has been a big help in combating the multiplying cost of the things that enter into the everyday life of the concerns we operate. Still another happening of vast importance to companies doing business under a public franchise was President Wilson's rate of $2 on bituminous coal. Not so long ago we were forced to pay more than twice that price for fuel, and glad to get it, as it was urgently needed. You can readily understand, then, that the government's price fixing of $2 for soft coal was a mighty important development for us. It increases in significance when you consider that the price for our products has not advanced."

Asked to express an opinion as to what the future might have in store for public utilities, Mr. Bodine replied that he did not know.

"I do not believe any man can answer that with any degree of accuracy," he said. "We are in an extraordinary age. Conditions new to this country—foreign to us all, I might add—continue to crop up, with history providing us with no idea as to how they should be treated. Personally I feel hopeful of the future. I believe that public service commissions throughout the country will be fair in dealings with public franchise companies."

New Jersey Commission Will Not Permit Toluol Recovery.

Deaf to the pleas of Government officials, including Major J. M. Burns of the ordnance department, United States Army, the New Jersey utilities commission has declined to permit the gas companies of that state to change the process of the manufacture of gas so as to recover toluol. The gas companies, including the Public Service Corporation, insisted that by changing their process greater quantities of this chemical could be conserved for the Government, which uses it in the manufacture of high explosives. Several cities, including Newark, Jersey City, Paterson and Passaic, it is reported, were represented at the hearing before the commission and contended that by permitting the gas companies to eliminate toluol the standard of gas would be so lowered as to render it almost worthless for illuminating purposes.

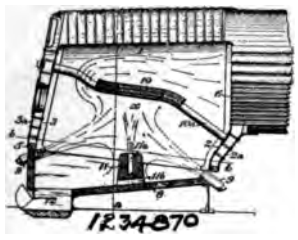
RECENT PATENTS

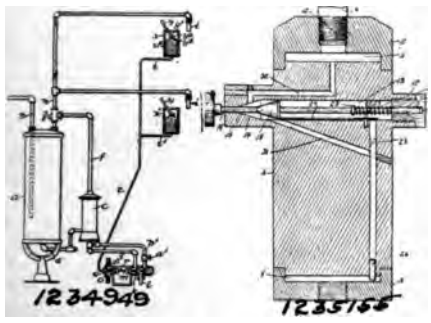
By R. S. McBride, U. S. Bureau of Standards

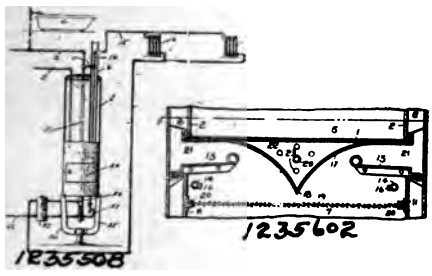
Patents Granted July 31, 1917.

1,234,726. SAFETY APPARATUS FOR GAS-TANKS. Rudolph E. Bruckner, New York.

1,234,870.* BURNING PULVERIZED FUEL. Virginius Z. Caracristi, Albany, N. Y., assignor to Locomotive Pulverized Fuel Co. The improvement in the method of burning pulverized or fluid fuel which consists in delivering a plurality of bodies or columns thereof to a furnace, upwardly and at different relative angles, toward a substantially central locus of combustion therein, and deflecting the flame of the fuel, in a plane above said locus of combustion, from said locus of







combustion toward the rear and top of the furnace.

1,234,886. PROCESS OF MAKING UNSATURATED HYDROCARBONS. Byron E. Eldred and Gail Mersereau, New York, assignors to Chemical Development Co. In the manufacture of unsaturated hydrocarbon gases, the process which comprises exposing hydrocarbon oil vapors for a brief period to a temperature approximating 700° C., and immediately removing the gas produced together with residual vapors of unchanged oil from the zone of heat so that the mixture is white and foggy, the time of exposure to the heat being such that while a large fraction of oil vapors is converted into permanent gas the remainder of said vapors shall comprise a substantial amount of easily condensable heavy oil, recoverable from the effluent mixture of gas and

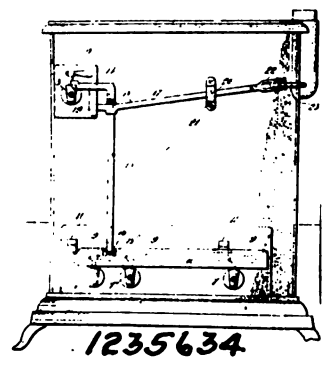
Patents on subjects of interest in the gas industry were granted on the dates indicated. The page in the Official Gazette of the United States Patent Office of these dates is shown in parenthesis for each patent. Numbers marked thus (*) are illustrated. Printed copies of patents are furnished at 5 cents each by Commissioner of Patents, Washington, D. C.

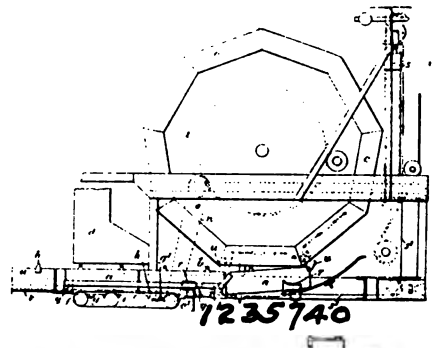
vapor, said heavy oil being adapted to produce oil vapors substantially like those from which the gas was produced.

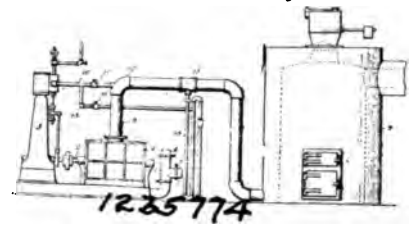
1,234,931 and 1,234,932. PREPAYMENT GAS METER. Nils David Nilson, Stockholm, Sweden.

1,234,949.* REMOTE CONTROL MEANS FOR WATER-HEATERS. Elmer S. Stack, West Somerville, Mass.

1,235,015. COMBINED GAS AND COAL RANGE. Ransom W. Davenport, Detroit, Mich., assignor to Detroit Stove Works, Detroit. In a cooking range, the combination with a casing having adjacent top sections respectively heated by solid and gaseous fuel, of a housing beneath the gas-heated section, an oven within said casing overlapped by said housing and arranged there beneath to form a flue there between, a firebox adjacent to said oven, and a casing above said oven adjacent to said firebox deflecting the gases from







the firebox into proximity with the stove top.

1,235,155.* AUTOMATIC CUT-OFF FOR GAS BURNERS. Thomas A. Payne, Bridgeport, Conn. An automatic cut-off for gas-burners located between the gas-cock and the burner comprising a body formed with a transverse valve-chamber.

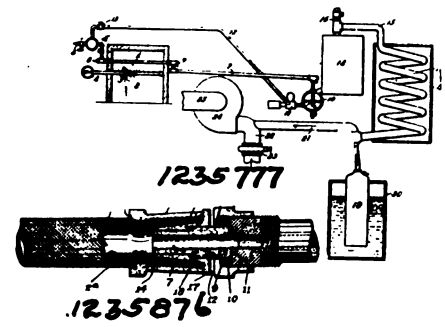
1,235,508.* HEATING SYSTEM. Charles H. Taylor, Oakland, Cal. A combined hot water supply and heating system.

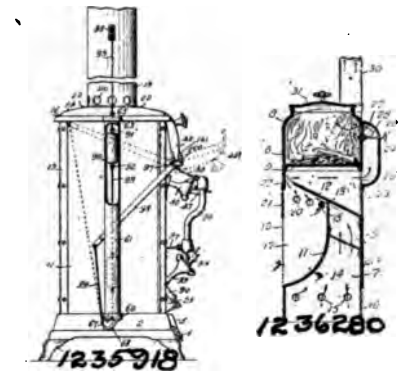
Patents Granted August 7, 1917.

1,235,541. REDUCING VALVE. Edward V. Anderson, Monessen, Pa., assignor of one-half to Charles E. Golden, Crafton, Pa.

1,235,573. SAFETY HEATER. Regnar Kidde, New York.

1,235,602.* GAS OVEN. George F. Reznor, Mercer, Pa. A deflector parallel with the burners and extending upwardly from between the burners toward said flues and downwardly so as to prevent the burning gases due to one burner from mingling with those due to the other





burner, and baffles above the burners so arranged as to direct the products of combustion from each burner upwardly between the baffle and the deflector, the gas from each burner first meeting air after issuing therefrom and being directed toward the deflector.

1,235,623. OVEN THERMOMETER. Albert E. Whittier, Bristol, Conn.

1,235,634.* SAFETY DEVICE FOR GAS STOVES. Joseph L. Anthony, Taunton, Mass., assignor to Weir Stove Co., Taunton, Mass.

1,235,673. THERMOSTATIC VALVE. James Logan Fitts, Merchantville, N. J., assignor to Warren Webster & Co., Camden, N. J.

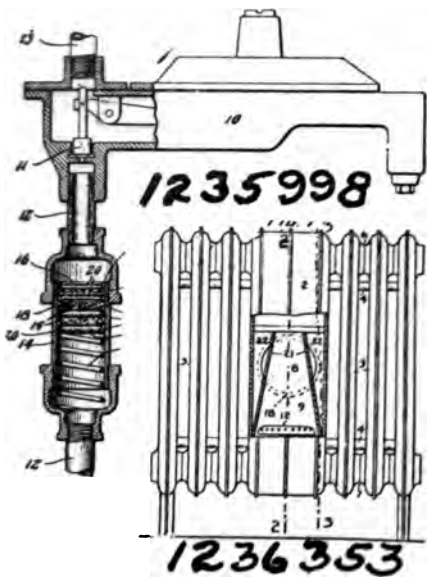
1,235, 686. PAYMENT IN ADVANCE METER. George Heeley, Paris, France, assignor to Compagnie pour la Fabrication des Compteurs et Materiel d'Usines a Gaz, Paris, France.

1,235,740.* MACHINE FOR STOKING GAS RETORTS. John Terrace, Grimsby, England, assignor to James George Willcox

Aldridge, Westminster, London, England.

1,235,774.* Process of and Apparatus for Producing Gas. Henry L. Doherty, New York, assignor to the Improved Equipment Co., New York. In the manufacture of gas the process which comprises maintaining a deep bed of ignited fuel, forming an admixed draft of steam and air automatically proportioned in a predetermined ratio adapted to maintain the temperature equilibrium occurring between heat producing and heat absorbing actions in the fuel bed at a temperature below the objectionable clinkering temperature of the fuel, said ratio being maintained constant by expanding steam to drive air and mixing the expanded steam with the driven air, and forcing said admixture draft through the bed of fuel.

1,235,777.* Cold Proof Gas and Method of Making the Same. Byron E. Eldred and Gail Mersereau, New York. In the manufacture of permanent illuminating gas, the process which comprises exposing heavy oil vapors for a brief time to a temperature around 700° C., interrupting the heating at a time when a portion but not substantially all of said vapors is gasified and cooling the gas to condense out residual oil vapors, and collecting the gas and admixing in an "unfixed" condition with permanent lean gas to make a compound cold proof illuminating gas.



1,235,876.* Hose Connection. Henry Cave, Elizabeth, N. J., assignor to Davis-Bournonville Co., Jersey City.

1,235,918.* Incinerator. Frank A. Nieberding, Cleveland.

1,235,928. Apparatus for Washing and Utilizing Waste Boiler Gases. Frederick Sargent and Herman C. Heaton, Chicago, assignors to the Babcock & Wilcox Co., Bayonne, N. J. In a steam boiler plant, a conduit through which the waste gases pass, means for spraying the gases therein, a feed water heater, and a conduit arranged to conduct the heated spray liquid to the feed water heater, the heater being arranged to keep the feed water separated from the spray liquid while conducting heat from the latter to the feed water.

1,235,998 and 1,236,000. Gas Purifier. George S. Neeley, St. Louis, assignor of one-half to Thomas O. Moloney, St. Louis. A combined gas purifier and lubricator for high pressure gas regulating valves.

1,236,280.* Gas Stove. Emma Ferry, Nevada, Mo.

1,236,327. Safety Device for Gas Ranges. Robert A. Mace, New Haven, Conn. A plurality of brackets extending downwardly from the under face of the top plate of the range and provided near their free ends with perforations, a utensil supporting element, integral legs depending from said utensil supporting element and passing through apertures in the top plate of the range and the apertures in the free ends, of said brackets.

1,236,335. Thermostatic Fuel Regulating Device for Gas Ovens. Benjamin Edward Meacham, Lorain, Ohio, assignor to American Stove Co., St Louis. The combination with an oven, of an elongated combined thermostat and gas supply housing arranged vertically outside of an adjacent and parallel the wall of the oven, the lower end of the housing having a gas burner communication extending within the oven.

1,236,353.* Gas Radiator. Michael J. Purcell, San Francisco.

COURTS-COMMISSIONS

Oklahoma Commission Given Sole Regulation of Utilities.

In the suit brought by the City of Pawhuska vs. the Pawhuska Oil & Gas Co., the Oklahoma Supreme Court that the provisions in the Act of April 2, 1915, (Laws, 1915, Chapter 200, page 407), "that this act shall not abrogate any existing contract, or affect or change the terms or conditions of any franchise granted by any municipal corporation prior to and in effect April 28, 1913," merely qualifies the direct legislative mandate of that act to "all persons, firms, or corporations furnishing gas in all municipalities having a population over 500 to do so through standard meters at meter rates," and does not affect the power of the Corporation Commission under the provisions of the Act of March 25, 1913 (Laws, 1913, chapter 93, page 150), to establish rates not inconsistent with such direct mandate.

The court further holds that wherever there is an apparent or actual conflict between enactments on the same subject the latest expression of the legislature will govern. Section 18, article 9, of the Constitution, says the court, did not confer upon the Corporation Commission jurisdiction and power to fix rates for a gas company furnishing gas within the limits of a city under franchise from the city. By chapter 93, Session Laws, 1913, jurisdiction is conferred upon the Corporation Commission over all public utilities. The power to regulate the charges for public services by municipal corporations is the power which it was the intention of the framers of the Constitution should be exercised by the sovereign power only. Such power is inherent in the state, and is a necessary attribute of sovereignty. No specific authority having been conferred by the constitution upon cities to fix and regulate the charges for gas in municipalities, the legislature had the right to legislate thereon whenever in its judgment the public interest required such action. The power delegated to the city of Pawhuska to regulate charges for light and gas under Section 593, Revised Laws of Oklahoma, 1910, was such a grant of power as could be taken away from said city by the legislature and conferred upon the Corporation Commission, as was done by chapter 93, Session Laws, 1913. The order of the Corporation Commission establishing rates for gas to be charged consumers in the city of Pawhuska by the Pawhuska Oil & Gas Co., and requiring the installation of meters, is a valid order under said act, and said order of the commission is not repugnant to Section 15, article 2, of the Constitution of Oklahoma, nor to Section 10, article 1, of the Constitution of the United States. Section 7, article 18, of the Constitution of Oklahoma, expressly prohibits the surrender by the legislative branch of the state government of the power to regulate the charges for public services.

Portland Company Asks Relief of Commission.

The Portland (Ore.) Gas & Coke Co., in a document filed with the Public Service Commission, supplementary to its petition asking for changes in the commission's orders as to meter testing and the constituent parts of the gas served consumers, declares that if prompt relief is not afforded as asked in the petition it will be unable further to render the service that the public demands. The company contends that it has lost approximately $400,000 in the last four years, and that from 1914 to the end of 1917 its operating income will show a decrease of $230,458.78, Of this amount 1917 will show a decrease of approximately $124,000.

The company asserts that taxes, labor and material costs are increasing and that its present system of testing meters every five years is a useless expense.

The Ohio utility commission, in the case brought by the city of Dayton against the Dayton Power & Light Co. to prevent the company raising its rates and declining to pay discounts, has denied the right of a city of that state to bring action against a utility for any general rates in effect, thereby creating a precedent in that state on public utility matters.

Commissioner Barhite of the New York Utility Commission recently heard a petition from the Niagara Light, Heat & Power Co., asking that it may be allowed to charge domestic consumers $1.40 a thousand for artificial gas in Tonawanda and North Tonawanda.

NEW PRODUCTS

Dixon's Silica Paint Recommended for Gas Holders.

Dixon's "Graphite" for October says: The gas holders of the Brooklyn Borough Gas Co. at Coney Island, N. Y., are respectively 100,000, 750,000 and 2,000,000 cubic feet capacity. The Vassilaros Contracting Co., of New York, were the contracting painters. The paint selected was Dixon's Silica-Graphite Paint, as that paint has proved most serviceable for exposed metal surfaces, these holders being subjected to the destructive effect of salt air and other rust-producing agencies. The Manitowoc (Wis.) Gas Co. states that it has used Dixon's Silica-Graphite paint for over twelve years on its gas meters, holders, etc., and that it has proved much better than any other paint ever used.

Victor Blowers for Gas Company Commercial Departments.

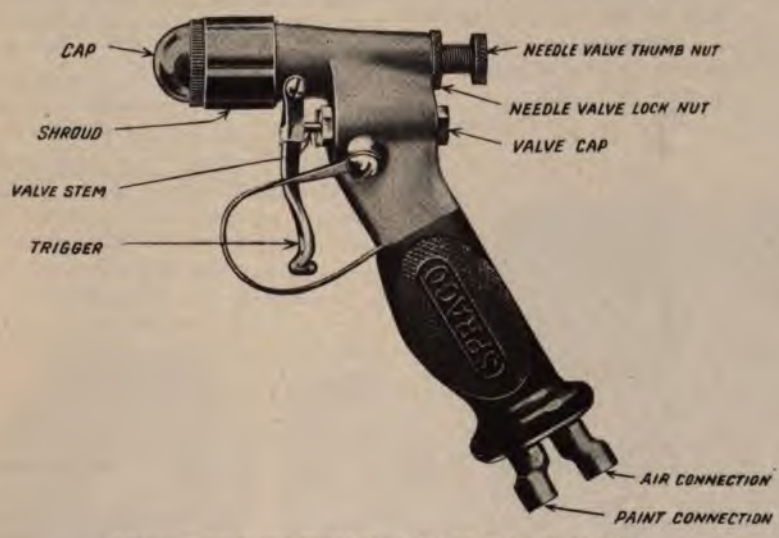
For gas appliances, gas furnaces, laundries, brazing forges, soldering, etc., the Victor positive blower is said to possess advantages which every gas company commercial manager should investigate. This blower is featured in a circular issued by the Connersville Blower Co., Connersville, Ind., well-known manufacturers of blowers, gas, oil and water pumps. A few of the advantages claimed for the Victor blower follow: No valves of valve ports, only two moving elements, no light or delicate parts, no internal contact or wear, no reciprocating motion, no reversals to limit speed, balanced at all speeds, minimum vibration, no internal oiling required, all sizes and capacities. Further details concerning this blower will be gladly sent by the manufacturer on request.

MODERN PAINTING.

Compressed Air Now Being Successfully Used for Applying Paint To All Surfaces.

The modern method of applying paint and other surface coatings is by the use of compressed air. This is rapidly superseding the old hand-brush method, not only by reason of the great saving in time and labor, but also due to the fact that better results are obtained.

The Spraco pneumatic painting equipment, which was developed for this purpose by the Spray Engineering Co., of Boston, is compact, portable and adapted for either shop or field use. It is furnished ready for immediate use with the exception of attaching the air hose and connection to your compressed air supply. All necessary adjustments are quickly made by hand without the use of tools. Where compressed air is not available, the company is prepared to furnish complete gasoline engine or motor-driven air compressor units.



Spraco Pneumatic Paint Gun for Shop or Field Work.

A few of the advantages claimed are as follows: Under average conditions one unskilled man can do the work of four skilled painters using hand brushes. Finely finished surfaces, free from streaks and brush marks, are produced. Rough surfaces and those extremely difficult or impossible to reach with a hand brush are easily and rapidly covered. All parts are of simple design, easy of adjustment and are made to withstand hard service. The gun may be blown free of paint and cleaned without taking apart. The gun may be quickly attached to the extension pole attachment for painting surfaces beyond reach of the operator. By means of interchangeable nose pieces, the standard gun is capable of handling all kinds of liquid coatings. Where single coat work is required, either a lighter or a heavier coating can be secured than is possible with the ordinary brush method. This equipment is especially applicable for painting gas holders, structural steel work, buildings, machinery, etc.

Change of Address for Safety Gas Main Stopper.

The Safety Gas Main Stopper Co. has moved from 133rd street and Alexander avenue and now is located at 257-263 East 133rd street, New York City.

Quincy Wins Place in Humphrey Contest.

The Humphrey Co.'s window display contest is still the talk of commercial circles. This affair undoubtedly produced some of the best window trims the people of gas served cities have ever seen. The accompanying illustration is a sample of the attractive designs built around the automatic heaters during these window displays. It was put out by the Quincy (Ill.) Gas, Electric & Heating Co., and won honorable mention in the Humphrey contest.

Quincy (Ill.) Window Which Won Honorable Mention in Humphrey Contest.

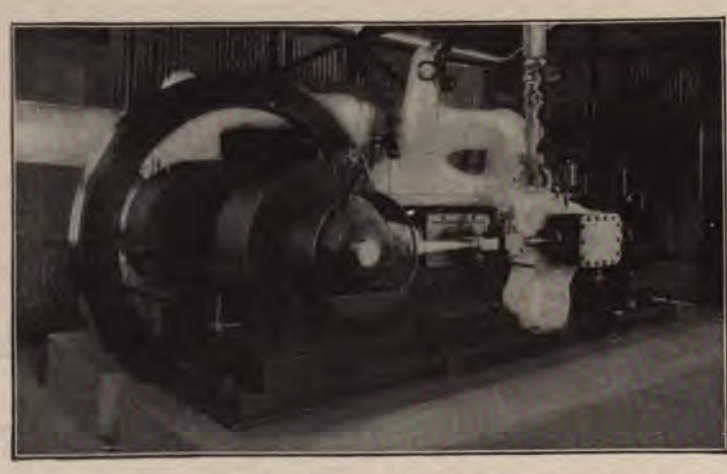
Gasoline Recovery

Process and Equipment Involved in Its Extraction from Natural Gas

Companies interested in the recovery of gasoline from casing-head gas will be interested in a bulletin recently issued by the Worthington Pump and Machinery Corp., 115 Broadway, New York, describing Laidlaw gas compressors, gas expanders and vacuum pumps for this purpose.

The process used in the recovery of gasoline from natural gas is extremely simple in principle and involves only the alternate compression and cooling of the gas, states the booklet. It will be understood that gasoline in the form of vapor constitutes part of the gas as it comes from the well or casing-head. If this gas is saturated, gasoline would be immediately precipitated when it is compressed, provided it could be kept at a constant temperature, but since the heat of compression increases its temperature, the gasoline is still retained as a vapor. When it is cooled, however, gasoline is thrown down in the form of condensate, and if the gas is cooled to its original temperature, the gasoline still retained in it as vapor will only be in the proportion of its initial and final volume, or very approximately so. Since there are always present a great number of condensable fractions, each a different hydrocarbon, the precipitate of each depends upon the partial pressure of each.

The application of the principle as briefly stated requires the installation of a two-stage gas compressor with suitable intercooler and aftercooler. Vacuum pumps for bringing the gas from the wells to the plant are also often required. The intercooler and aftercooler are of the open coil type, and assuming that the surface available is large, the efficiency attainable depends upon the temperature of the cooling water. It is of great importance, therefore, to make provisions for an ample supply of water. For this purpose cooling towers are generally provided, since in most oil fields fresh water is obtainable only in limited quantities. It is pointed out that with cooling towers, even of the best design, it is impossible to attain low temperatures during the hot weather which prevails during a large part of the year. As a means, therefore, of supplying additional cooling effect, a Laidlaw-Dunn-Gordon expander refrigerator is installed, the function of which is to further reduce the temperature of the gas itself after having passed through the cooling coils. It consists of a cross-compound expansion gas compressor. The compressed gas coming from the aftercooler is used in this expansion engine, and because of the work done in its cylinders is expanded adiabatically, or in other words, in such a manner as to reduce its temperature. The cold gas is then returned through double pipe coils where its refrigeration effect is utilized to further cool the compressed gas. The amount of refrigeration thus available is in direct proportion to the amount of work done in the compression cylinders driven by the expander, and is proportional to the total number of expansions; that is, to the ratio between its initial and final pressure, provided, of course, the cylinders of the expander are properly proportioned. Thus it will be seen that the expander compressor is not only a source of additional cooling, but also makes possible the compression of additional gas used in the process, without the expenditure of additional power. The value of this added refrigeration can hardly be overestimated, since the precipitation of gasoline in the final stage of the process depends entirely upon the temperature to which it can be reduced. The Laidlaw-Dunn-Gordon expander produces this refrigeration without the expenditure of additional power, and the energy in the compressed gas, which otherwise would of necessity be wasted, is available for useful work in compressing additional gas used in the process. The illustration shows an expander in actual operation for a plant having a capacity of one million cubic feet. The ice and snow which cover the cylinders and the exhaust pipes show to what extent refrigeration is carried. In many installations, it is declared, temperatures many degrees below zero are obtained.



Typical Installation of a Laidlaw-Dunn-Gordon Gas Expander.

Push Services and Save Lawns, Advice to Gas Companies.

One of the most discouraging features for a "good will" campaign directed at a gas company's consumers is the service installation that tears up a prized lawn. The Easy Pipe Pusher, so its makers state, enables the gas company to avoid damage to the consumer's yard. It will push services underground for considerable distance and with exceptional accuracy. In addition to the preservation of the property, this device has an appeal for gas companies in its economy and saving of the labor of several men. The Easy Mfg. Co., David City, Neb., have sold the Easy Pipe Pusher to many gas companies and report that users are well satisfied with their purchases.

Venturi Meters Installed at Niagara Power Plant.

For the water entering each boiler and the condensate coming from each turbine there is a Venturi meter installed to measure the quantity at the Niagara Falls power plant. A total of 2,400,000 pounds of water passes through these meters hourly. This installation is featured in Bulletin 174 recently issued by the Builders Iron Foundry, of Providence, R. I., a copy of which will be sent by the manufacturer on request.

The Asbestos Protected Metal Co., of Pittsburgh, announces the appointment of Ole K. Olsen, 822 Perdido St., New Orleans, as sales agent for Louisiana and the southern portion of Mississippi.

Fig. 1—Explosion Reduces Oil Well Casing from 18 to 6 Feet Without a Fracture.

Unusual Pipe Experiences

Research Department of National Tube Co. Cites Peculiar Incidents With Pipe—Practically Impossible to Duplicate the Circumstances Involved

Ordinary pipe is used in various industries and some peculiar experiences are encountered. We mention below some unusual or "freak" incidents in which the inherent qualities or "punishability" of pipe are demonstrated—for the most part by unusual accidents. As will be noted, it will be practically **impossible to** duplicate the circumstances involved in connection with many of the various pieces shown.

The piece of 5—3/16-inch steel casing shown in Fig. 1 was originally about 18 feet long and was stuck in an oil well. 170 qts. of nitroglycerine had been placed in the well and same was shot off with the idea of blowing this piece out—at the same time "shooting" the well. Instead of blowing it out, however, the casing was reduced in length from about 18 feet to approximately 6 feet. It was drawn to the surface after great difficulty and was crushed, twisted and distorted, but no fracture was shown. This happened in the Ohio field.

A string of 340 feet of ten-inch, 32.515-pound, South Penn oil well casing fell 236 feet when an elevator let go. Fig. 2 shows what happened to the bottom length when the casing hit the bottom of the well. The thread protector was forced over the threads and up over the pipe approximately 12 or 13 inches and the pipe was bent backward and inward. As will be noted, however, the material shows no fracture. This happened in the Oklahoma field.

Fig. 3 shows "3 in 1" section of casing. There was a string 1,440 feet long of 8¼-inch, 24-pound steel casing; the elevator let go and the string—weighing something over 34,000 pounds—dropped 200 feet to a bottom of limestone. The three sections on the bottom were telescoped—one inside and one outside. It will be noted, there was no failure in the weld—and the three lengths telescoped without a crack. The exterior apparently shows a straight length of casing. The particular piece shown was machined to show the three separate sections as telescoped. Note the circumstances are substantially the same as Fig. 2—but the results radically different. This happened in the Ohio field.

Fig. 4 shows 26 lengths of four-inch rotary pipe, about 500 feet in length. The well was about 2,000 feet deep and all of the pipe was out of the ground excepting this particular 26 lengths when the gas began to show up and blew the pipe completely out of the well without making a sign of a break in a single joint of the 26 lengths. One of the operators well said that this pipe was "flexible as a giant whiplash." This happened in the Texas field.

Fig. 5 shows a piece of eight-inch pipe subjected to a twisting strain of 713,000 inch-pounds. In appearance this looks almost like a piece of rubber and yet when it is remembered that this pipe has a thickness of about one-third of an inch and weighs about 29 pounds per foot the enormous twisting strain can be appreciated. No sign of fracture appears in the material.

Fig. 6 shows a number of pieces of pipe welded together by the autogenous welding process and then bent into the shape shown. The white or frosted effect is due to the fact that this was connected up with a refrigerating machine and all the pipe is covered with a thick frost.

Fig. 7 shows a bow-knot made from pipe and is self explanatory.

Fig. 2—This 10-in. Casing Fell 236 Feet.

Fig. 3—Three Sections of Casing Telescoped.

Fig. 4—Twenty-Six Lengths of Four-Inch Pipe Blown from Gas Well Without a Sign of a Broken Joint.

These unusual pieces of pipe tend to show the inherent reserve strength of tubular material. A few years ago it

Fig. 6—Various Pieces of Pipe Welded.

would have been impossible to secure pipe with physical properties such as shown and these specific examples reflect the advance and improvement in metallurgical methods and practice in the manufacture of steel for pipe.

Fig. 5—Eight-Inch Pipe Subjected to Twisting Strain.

Fig. 7—Bow-Knot Made from Pipe.

About Draft Troubles and the Remedy.

The Lezius Automatic Draft Regulator Co., of Cleveland, has issued a blue print descriptive of "Common Draft Troubles and Their Remedies" which embraces some valuable and interesting information for the industrial gas man. This blue print will be sent free on request. The Lezius automatic draft regulator is meeting with gratifying success from gas companies and gas appliance makers. The Bastian-Morely Co. had recently adopted the Lezius regulator on its Royal water heaters.

Swivel Joint for Gas, Steam and Air.

The Knudsen packless swivel joint is the subject of an attractive booklet, gotten out by its makers, the Universal Valve Co., Burlington, Wis. This swivel joint is said to be very satisfactory in establishing flexible lines for the transmission gas, steam, air and ammonia. A copy of the publication may be had on request.

Gas Machinery Water Gas Sets in Demand.

The Gas Machinery Co., of Cleveland, is doing a rushing business in 11-foot water gas sets. Two 11-foot sets have been purchased by the Detroit City Gas Co. for its new station J. These two new sets bring the total of Gas Machinery 11-foot sets in Detroit to eight. In addition to the Detroit installations, 11-foot sets also have been recently ordered from the Gas Machinery Co. by the Philadelphia Suburban Gas & Electric Co., Chester, Pa., and the Memphis, (Tenn.) Gas & Electric Co.

Babcock Represents Hale Mixer on Pacific Coast.

The International Hale Gas Mixer Co. has appointed the C. B. Babcock Co., San Francisco, its Pacific Coast representative. Pacific Coast business in the Hale mixer is lively at the present time and it is expected to be even larger with "Bab" and his bunch on the job.

"Pittsburg" Heaters in Handsome New Booklet.

The Pittsburg Water Heater Co. has just issued an artistic and at the same time a very practical booklet on the "Pittsburgh" and the "Pittsburgh-Bungalow" automatic gas water heaters. The booklet is known as Catalog P & B-85. The publication is designed for distribution to gas consumers and as such it carries an irresistible message on the subject of hot water. Handsome illustrations picturing attractive young women making use of hot water from the "Pittsburgh" automatics in various household work occupy full pages in the forward part of the booklet while the remainder is devoted to the facts and figures pertaining to the heater and its uses. The detail construction of the machines is shown in comprehensive style and any reader can clearly understand the mechanism from a little study of this book.

Commercial managers should get in touch with the company at once and arrange for a supply of these highly illuminating booklets. They are real tangible assets to the commercial department. The Pittsburg Water Heater Co. will furnish them on request.

New Tenney Plant Under Construction at Estherville, Ia.

The municipality of Estherville, Ia., through its engineers, David G. Fisher & Co., of Davenport, Ia., E. F. Buhlman in charge, have purchased a carburetted water gas works of the American Gas Construction Co., of Newton, Ia. Work is to begin at once and be completed by the first of the year. The generator will be of the latest type of Tenney-Lowe without waste heat boiler. The present installation consists of a 30,000 cubic feet gas holder and low pressure distribution will be used.

New Line of "Quick Comfort" Portable Heaters.

The Ringen Stove Co., of St. Louis, is meeting with an abundant success with its new line of "Quick Comfort" gas heaters. There are a dozen or more types in this new line, including the copper reflector, asbestos back and copper reflector, and incandescent fuel heater, for either natural or manufactured gas. With the established reputation of the house behind this fine new line, there will doubtless be a big sale of them throughout the country this season.

"Quick Comfort" Gas Heater No. 730.

HERE'S A NEW ONE.

The "Garland" Line Now Includes a Heat Storing Range of Cabinet Type.

The Michigan Stove Co. has announced a new addition to its famous "Garland" line of gas ranges. This latest arrival is a heat storing range of the cabinet type and in every detail is a worthy member of the "Garland" family. In its literature on the subject of the heat storing range, the company describes its advantages as follows:

"This 'Garland' gas range with its heat storing oven advances gas range utility to include almost the advantages of fireless cooking—but without its bother. Start the oven in your usual way. When it is baking properly, turn a lever—that is all you have to do. The oven will then continue to bake as it should—but with a flame that is hardly noticeable. This small flame, however, serves to keep the oven ventilated. It makes it indeed, a wholesome oven, one that is dry and odorless at all times. Then consider the other cooking advantages of this new type 'Garland.' The splendid cooking top with its three star burners, giant burner and simmerer. The convenient broiler with its individual burner and the roomy warming shelf."

The "Kumfy" Heater Fits on the Gas Jet.

The Ohio State Stove Co., Columbus, O., announces a new heating unit, this time an illuminating gas jet heater that burns with a white flame. It is a simple and inexpensive little appliance, but its maker backs it up with the statement that it is the most efficient little room warmer on the market and that it has already demonstrated its popularity in the hundreds of orders that have been received for it. They say of it:

"The 'Kumfy' gas jet heater with adjustable wall protector is different from any other ever made. It is made on the principle of a reflector stove, the tips being of genuine lava. Although it gives light as well as heat we sell it simply as a heater and it is a real heater. It throws the heat downward—it is an ornament instead of merely a fixture—and being white flame instead of blue flame, it is the only safe heater ever made. Blue flame heaters are a constant menace to health, while the 'Kumfy' white flame gives off no offensive fumes or poisonous gases. It will heat quickly any ordinary size room; a fine thing for the bath room, den, library, bed room or that room that is always cold."

Master Craftsmen Make Wooden Cock Handles.

An item of gas stove construction, about which little is ever said, is the manufacture of wooden cock handles and oven door handles. Still, under the guidance of master craftsmen, this detail has become a fine art. The Detroit Wooden Products Co. has an entire plant devoted to woodwork of this nature and it is a plant of no mean proportions, turning out many thousands of these wooden pieces each day. The timber entering into the construction of these products is carefully selected and thoroughly seasoned before going to the saws for division into pieces easily handled by the turning machines. The shaping of each oven door or cock handle is done on automatic machinery so that each unit of the output is uniform and well finished. This work is done with a rapidity that means low production costs. The shavings and saw dust is used under the company's own boilers which operate the entire power and heating system of the plant. The exhaust steam is used in the drying kilns.

The plant itself is a delight to the technically trained eye and has resulted in the production of wooden parts, first class in every respect, and at a price that commands business from the leading gas stove makers. The Detroit concern makes these parts in a wide variety of shapes and finishes.

Gas-Heated Washing Machine Becoming Big Factor.

Increased sales of gas appliances by the Peoples Gas Light & Coke Co., Chicago, for the first six days of October, 1917, over the corresponding period in 1916, were as follows:

Single ovens, 46.51 per cent.; double ovens, 4 per cent.; cabinets, 16.13 per cent.; tank water heaters, 14.28 per cent.; space heaters, 304.65 per cent.; kitchen heaters, 103.28 per cent.; automatic water heaters, 360.00 per cent.; gasteam radiators, 466.66 per cent.; arc lamp installations, 59.01 per cent. The sales of gas heated washing machines and incinerators are not included in the above list as they were not on sale during this period in 1916, but the "Advance News," published for employes of the Peoples Gas Co., says, in its October issue: "The gas heated washing machine is becoming a prime factor in the gas industry. The idea seems to be getting abroad that even the best washing machine without a gas burner adjustment is only about 75 per cent. efficient. The number of washing machines sold by our laundry section during the month of September was nearly double that of August. The advantage of having heat applied right under the machine is immediately appreciated by every woman and in course of time no laundry appliance will be considered a washing machine unless it has a gas burning attachment."

Eclipse Exhibit Popular at Coast Convention.

The Eclipse Gas Stove Co., of Rockford, Ill., had one of the most prominent and popular booths at the recent exhibition of appliances at the Pacific Coast Gas Association at Santa Cruz, Cal. Domestic and hotel ranges predominated in the exhibit and it is hardly necessary to state that both lines were objects of extreme interest to the commercial men of the far west. The booth was lavishly decorated with banners, palms and placards, as the accompanying illustration shows.

An Investigation of Pipe Corrosion.

An interesting and valuable investigation of pipe corrosion showing service records of iron, steel and brass pipe used for hot and cold water supply lines in 125 Pittsburgh apartment buildings has been made by Thomas F. Payne, sanitary engineer. The results of this investigation have been issued as bulletin 30 by the A. M. Byers Co., Pittsburgh, a copy of which will be sent by that company on request.

Exhibit of Eclipse Gas Stove Co. at Santa Cruz Convention.

ABOUT MEN YOU KNOW

Doty Off To Direct Camp Grant Utilities.

Paul Doty, vice-president and general manager of the St. Paul Gas Light Co., is now at Camp Grant, near Rockford, Ill., where he will assume charge of all utilities, including water, sewerage and lighting. He will enter service with a major's commission. Major Doty has had ten years' experience in the national guard. Four captains will comprise his commissioned staff. He will have 300 men serving under him.

Roy W. Brown, formerly New York representative of THE GAS RECORD, now is with Co. L., 344th Infantry, at Camp Grant, Rockford, Ill.

R. C. Frampton, formerly president of the Pittsburg Water Heater Co., now is general manager of the Hudson-Phillips Motor Car Co., St. Louis, local distributors of the Hudson automobiles.

H. C. Blackwell has resigned as vice-president and general manager of the Peoples Light Co., of Davenport, Ia., to accept a similar position with the Kansas City Light & Power Co.

A. E. England now is superintendent of the gas department of the Alton (Ill.) Gas & Electric Co., vice A. F. Blossey, who has retired to a nice farm.

James Clyde Rushin is a papa now. Yep, a boy. Born down in Georgia in September. The report that the proud father is a grandson of the famous Rushin who officiated at the Atlanta convention of the N. C. G. A. is a mistake. That Rushin and the father of this child are one and the same. Yes, siree. The new one is to be known as James Clyde, Jr. He will be trained in the gas business at an early age. His first smile was coaxed out by his father's valise, the same valise everybody laughs at. The man who stole it recently brought it back.

Lee Chamberlain, who went to the Lansing (Mich.) Fuel & Gas Co., as industrial fuel engineer last November, has been successively promoted to sales manager and recently to fill the vacancy created by the resignation of Harry L. Bryant, secretary, whose health compelled him to seek an open air occupation for a time. Mr. Bryant is visiting in Colorado Springs, where he reports that fish are plentiful—at the restaurant.

RAY STRETCH MANAGER.

Takes Charge at Bloomington, Ill. A. E. Merchant Takes Hold of New Orleans Gas Plant.

Ray Stretch, formerly New Business Manager at Terre Haute, Ind., but more recently serving in the same capacity at Wilkes-Barre, Pa., has been

Ray Stretch, Bloomington, Ill.

appointed manager of the Union Gas & Electric Co. at Bloomington, Ill., succeeding A. E. Merchant who takes charge of the gas plant at New Orleans. A. J. Jackson has assumed the duties of the Commercial Department at Wilkes-Barre while Mr. Frankenberger takes the place of Guy Veatch as superintendent at Bloomington.

T. W. Neff has taken charge of the gas plant at Baton Rouge, La., vice "Buck" Haynes, recently deceased.

MacDougald Dexter, superintendent of the Columbus (Ga.) Gas Co., has applied for a patent covering a gas pressure regulator designed by him.

J. W. Christian, sales manager of the Haverhill (Mass.) Gas Light Co., has returned from a pleasant vacation spent in the Adirondacks region.

V. E. Bird, manager of Connecticut Power Co. at New London, Conn., is back at his desk after a vacation in the mountains.

Death of Craig Ridgway at His Home in Coatesville, Pa.

Craig Ridgway, founder of Craig Ridgway & Son, manufacturer of hydraulic elevators, died at his home in Coatesville, Pa., Sept. 28, aged eighty-nine. Mr. Ridgway was born on July 20, 1829, at Crosswicks, N. J. He went to Coatesville in 1863, when he accepted in trade for his New Jersey farm, the William Dripps Foundry & Machine Shop. Mr. Ridgway was popularly known as the "grand old man." He, together with Capt. Ash, laid out the original boundaries of Coatesville borough. He was a school director for 59 years and councilman for several terms. He is survived by his sons, William H. and Ellis B. Ridgway, who have been active in the management of Craig Ridgway & Son for many years.

The many friends of Bert Young, of the Michigan Stove Co., will be pleased to know that he has completely recovered from a recent threatened illness from which serious results were averted by his vigorous constitution.

F. S. Wade, superintendent of operation for the Southern Counties Gas Co., of California, and Fred C. Champion, industrial salesman for the same company, were the two representatives of this fast-growing southern California gas corporation to attend the recent Pacific Coast Gas Association convention at Santa Cruz.

Ferdinand R. Bain, president and general manager of the Southern Counties Gas Co., of California, left Los Angeles early in October for an extended business trip throughout the East. President Bain went first to Chicago and then put in the balance of the time in and around New York City. President Bain returned to Los Angeles the latter part of the month.

H. B. Bettinger, of the Gas Engineering Department of Stone & Webster, Boston, recently concluded an extended trip to some of the company's gas properties at Baton Rouge, La., and other Southern points.

James H. Hood, Belmont, Mass., who was appointed director general of construction in France for the Stone & Webster Engineering Corp., Boston, has arrived in that country.

tion between the results of physical tests of coke and its value in practical use is indefinite, different observers may differ widely in their opinions as to the suitability of a given coke for any purpose. Usually the tests made were conducted under operating conditions that gave satisfactory results with other coke, and without regard to any difference in the nature of the Illinois coke. The quantity of coke available was usually too small to permit tests to determine how far changes in practice would effect economy. If through the knowledge gained by experience methods of use could be changed to suit the coke, better results would probably be obtained.

Coke from By-Product Ovens.

Most of the tests of Illinois coal alone in by-product ovens were made with the coals that had given the most promising results in beehive ovens. Therefore the quality of the coke from different by-product oven tests did not vary so much as did the coke from beehive-oven tests. The coke was not as strong as by-product coke from Eastern coals. The structure was fairly uniform, the cells were small and numerous, and the cell walls were thin. The coke had a tendency to break into pieces about six inches long and one or two inches in diameter. Some of it showed numerous cross fractures. When tumbled in a pile it gave a rustling sound and did not have a metallic ring. It contained considerable nonfused material.

Coke made in by-product ovens from mixtures of Illinois coals with low-volatile coking coals was of better quality than that made from Illinois coals alone. The pieces were blocky, the coke was less friable, and the tendency to cross fracturing was somewhat reduced. Mixtures containing 20 per cent. of Illinois coal gave better results than mixtures containing larger percentages.

Use of Illinois Coke.

Opinions as to the value of Illinois coke for metallurgical work differ. Most observers agree that it is not suited for use in large blast furnaces, but some think that it can be used in small furnaces, foundries, and smelters. The most promising outlet for Illinois coke is as a fuel for domestic and other purposes not requiring coke of as high a grade as is necessary for metallurgical work. Thus, coke that will stand handling without too much loss by breakage can be used for practically all heating and power purposes for which bituminous coal is now used. Furthermore, a coke containing two per cent. of sulphur will find as ready a sale for such purposes as one containing one per cent. The development of this trade to consume the output of several ovens would require considerable educational work, but once established there would be smaller fluctuations in the demand from year to year than in that for metallurgical coke, the consumption of which is dependent on the iron and steel industry. Producers of coke, by offering it at a reduced price, can induce many consumers of coke for domestic purposes to lay in a supply during the summer months and thus equalize demand. Work has already been started to develop the domestic trade in the Middle West and in the Northwest, with promising results. The high price of the domestic sizes of anthracite and the increasing opposition to the smoke nuisance are factors favoring the use of coke. With the enforcement of smoke ordinances in large cities like Chicago, the railroads will be forced to use coke on locomotives within the city limits or resort to electric power.

The importance of coal gas for lighting has increased recently because of the higher cost of making enriched water gas, caused by a higher price of the oil used in its manufacture. The oil problem is becoming serious with water-gas manufacturers and may cause a return to the use of coal gas. In that event the use of Illinois coals in by-product ovens in certain localities, with sale of the coke to the fuel trade, use of the gas for cooking and lighting, and recovery of by-products, would offer a promising field of development.

Use of Coal in Gas Retorts.

At present a small amount of Illinois coal is used alone for making gas in some of the small plants where the cost of Eastern gas coal is too high. In other plants one-third of the retorts are charged with Illinois coal and the other two-thirds are charged with Eastern gas coal, the coke being kept separate. Illinois gas coke is of poorer quality than gas coke from Eastern coals; it is light and porous, will not stand much handling, and is easily distinguished from Pittsburgh coke. Lengthening the time of carbonization seems to improve it somewhat. In places where competition is not keen it is sold to domestic trade and where competition is active it is used for heating retorts and for making water gas. In tests of Illinois coke with an 11-foot water-gas machine, owing to the formation of clinkers the capacity was reduced about 20 per cent. in comparison with coke from Pittsburgh coal. The consumption of Illinois coke was about 10 per cent. larger.

A yield of 4 to 4½ cubic feet of gas per pound of Illinois coal can be obtained, as compared with 5 or 5½ feet from Eastern coal. Gas from Illinois coal has a heating value of about 600 B. t. u. per cubic foot, and a candle-power of about 15. A larger quantity of gas can be obtained, but the excess is mostly hydrogen, which has no illuminating power and a low heating value per cubic foot. As city ordinances or state laws require illuminating gas to have a certain candle-power or heating value, it is advisable to stop carbonization before all of the lean gas is driven off. The low yield per pound increases the cost of manufacture, as more coal must be handled and a larger generating capacity provided to make the same amount of gas. As coal retorts are usually worked at their full capacity, any increase in output must be obtained from additional retorts, involving a larger investment.

If the quality and appearance of the coke could be improved, the author believes more Illinois coal would be used for making gas. The same coal makes better coke in by-product ovens than it does in gas retorts and at least part of the difference is due to methods of operation. If the coal were finely pulverized before charging, if the size of the charge were increased, and if the method of heating were similar to that used in heating by-product ovens, it seems possible that the quality of the coke could be improved without impairing the yield of gas.

Results in Gas Retorts.

The results obtained in gas retorts from the use of Illinois and Eastern coals in separate retorts have caused several plants to adopt such procedure. The plants have been able to show a reduction in cost of gas of about two cents per 1,000 cubic feet when one-third Illinois and two-thirds Eastern gas coal were used.

The gas and the by-products from the two sets of retorts go into the same recovery system, but the coke is kept separate. The quality of the gas is about the same as from Eastern coal alone and the yield is only slightly less. There is not much difference in the yields of tar and the ammonia, the former being slightly less and the latter slightly more than from Eastern coal alone. The coke from Illinois coal is used for heating retorts and making water gas, and that from the Eastern coal is sold for domestic use. If the coals were pulverized and thoroughly mixed instead of being charged into separate retorts, it is believed that all of the coke could be made suitable for the domestic trade. The cost of such preparation might be met by increasing the proportion of the cheaper Illinois coal.

Use of High Temperatures.

There is a rather general opinion that high temperatures give better results in making coke from Illinois coal. Some investigators believe that high temperature combined with fine grind-

GAS LITERATURE AT A GLANCE

Conducted by R. S. McBride and C. E. Reinicker, Bureau of Standards, Washington, D. C.

The Utilization of Lignite as Fuel.

By Daniel Bellett, "Revue General Sciences," 28, 118-24 (1917).—A general article on the occurrence of lignite deposits and the uses to which the fuel is put. A commercial product known as kaumazite is made from Bohemian lignites by a process of low-temperature distillation which leaves a residue having a heat value of 6,800 calories, a carbon content of 77 per cent., ash 15 per cent. and water 5 per cent. The distillation yields gas and various hydrocarbon oils which are used for fuel. The process of briquetting is described with some detail.

The Future Development of Generator Operation.

By F. Hoffmann, "Feuerungstechnik," 5, 3-8 (1916).—Hoffmann looks forward to the time when all coal will be gasified before use in order to recover the by-products. This will cause a great advance in generator and producer operation and construction, with the probable formation of large central stations producing gas and recovering by-products and disposing of both to neighboring consumers. In order to recover the by-products from the coal, the coal must either first be coked and the coke used in the generator or the coal used directly in the generator and the by-products recovered. The future development of coke gas producer has small prospects, as only certain coals can be coked, the gas produced is of low heating value, and the operating costs are high, due to the high temperatures in the generator. Two considerations have in the past stood in the way of a satisfactory economic solution of the problem of by-product recovery from generators using the coal directly. The first, the high steam consumption, which appeared necessary in the past to obtain a maximum decomposition of the combined nitrogen in the coal has been considerably reduced without reducing the yield of NH_3. The second was the high installation cost and the large amount of space occupied by the recovery apparatus, both of which have been materially reduced in recent years.

Illuminating Gas Poisoning.

By A. H. Hubner, Bonn. "Munich, med. Wochschr," 63, 677-9 (1916); "Chemisches Zentralblatt," 1916, II, 24-5, via Chemical Abstracts.—It has been and is still believed that the poisonous constituent of illuminating gas is CO. It is demonstrated, however, that illuminating gas is more toxic than pure CO. This is accounted for by the composition of the gas; CO 5-10, H_2S 0.5-0.6, HCN 0.08-0.15, CS_2 0.08-0.17 per cent., and NH_3. Other conditions in the gas works which are concerned in the production of gas poisoning are discussed. The danger of poisoning is occasionally increased when the gas becomes odorless by passing through a layer of earth. The symptoms and course of acute poisoning are described. The possibility of chronic gas poisoning exists.

The Composition of Power Gases.

By W. A. Tookey, "Journal of Society of Chemical Industry," 36, 309-16 (1917), via Chemical Abstracts.—The varying composition of the gases used in various engines, whether oil "vapor" or oil "mist," town gas of 500 B. t. u. per cu. ft., or producer gas of 130 B. t. u. per cu. ft., has no appreciable effect on the performance of the engines. Whatever the composition or calorific value of the gaseous mixture of combustible and incombustible constituents, or whether diluted by excess air or residual gases from previous explosions, the output is of the same order in all types of internal-combustion engines for a given strength of mixture when calculated on the basis of the mean pressure produced by the combustion of the charge and acting upon each square inch of the piston. The actual composition of power gases plays very little part in the thermal efficiency of internal-combustion engines, other things being equal, but whatever may be the composition every effort must be made to obtain uniformity and purity, remembering particularly that the less rich the gas is in calorific value, the more important it is that constancy of product should be striven for. The higher the percentage of incombustibles in the poorer power gases, the more the encroachment upon the air capacity of the engine cylinder, and consequently the limit is sooner reached in respect of mixture strength. The pressure of supply matters little as long as it remains uniform. If pre-ignition exists, it can be greatly decreased by reducing the amount of gas to the working charge. An excess of hydrogen or methane is usually considered responsible for pre-ignition, but without good basis. Whatever type of gas is used, its mixture with air and the explosion residuals practically eliminate all differences of calorific value within the engine cylinder.

Rapid Method for the Determination of Sulfur in Illuminating Gas.

By F. Mylius and C. Hüttner, "Berlichte," 49, 1,428-43 (1916), via Chemical Abstracts. Advantage is taken of the catalytic action of porous platinum. A combustion tube of quartz, 6cc. capacity, containing at most 8 grams porous platinum gives complete combustion with a small amount of heat. The tube shows at various points, temperatures from red heat to room temperature. In a comparatively small hot zone, sulphur is burned to SO_2. At a part where the temperature is slightly lower, SO_2 is oxidized to SO_3 and in the colder portion, water containing H_2SO_4 condenses. Later on, the H_2SO_4 solution is flushed out of the quartz tube with water and titrated with 0.001 N Na_2CO_3 using alcohol solution of iodeosin as indicator. This indicator is useful with strong acids, but is inapplicable for use with weak acids. Each determination requires only 200 cc. gas sample containing not more than 0.2 mg. sulphur. The combustion and titration complete require only ½ hour.

Removing Naphthalene by Sudden Condensation.

By Herr Moliere in "Het Gas" via "Gas World", 67, 100 (Aug. 11).—At Gonda a great deal of trouble had been experienced with naphthalene and as it was not practicable to install a washer to take naphthalene out with heavy oil Saint Claire Deville's method of sudden condensation was tried. An available scrubber was transformed into a tubular cooler; a Swesey tar separator was put in; and this with a small pump completed the equipment. The gas entered at the top of the cooler, passed down around the tubes and passed with the products of condensation directly into the Swesey separator. The cooling water entered the tubes from below. Oil was first used to wash the gas in the Swesey washer but so much tar was removed that the exhauster was not well lubricated and stuck from time to time. Water was then substituted and enough tar passed by to adequately lubricate the exhauster. The temperature of the gas at the exhauster was 42° to 50° F. With English coals there were deposits of thick tar at the inlet of the tubular cooler but these were easily dealt with by stopping the cooler and steaming it out for about two days. It was thought that these deposits were caused by too low temperatures at the washer due to too great a distance between it and the hydraulic main. The gas is not entirely freed from naphthalene but the quantity is kept well within workable limits.—D.

Utilizing Coal-mine Waste.

By H. Hull, "Electrical World," 69, 1,105 (1917).—Fine coal, of the nature of lignite, was dried till the moisture was reduced to 1 per cent., then ground so that 85 per cent. passes through a 200-mesh and 95 per cent. through a 100-mesh screen. It was kept out of contact of air as much as possible to prevent absorption of moisture. From the bottom of the bunker, the fuel was fed by two motor-driven screws into a 7.82 cm. supply pipe, through which it was blown to the furnace. The fuel was discharged into the side of an injector consisting of 38.1 cm. drum surrounding a nozzle on the end of a 25.4 cm. air-supply pipe. Dampers were provided in the drum and air pipe to regulate the amount of air supplied to the combustion chamber. At the start the dust was dropped on an oil flame and an extended Dutch oven with broad arch was used to assist the ignition. Considerable combustion space was required to secure satisfactory results. Results of test of a 300 h. p. B. & W. boiler burning 18,389 lbs. of powdered coal on a 12.8-hr. run are tabulated. Analyses of the coal, ash, and the flue gas are given. The boiler efficiency was 71 per cent. The boiler could be forced to 200 per cent. of the rating without apparent damage to brick settings or tubes. No fusing of ash resulted. The coal furnished 11,760 B. t. u.

Selection of Coal.

By C. H. Parker, "Electrical World," 69, 1,112 (1917).—Certain grades of coal whose ash does not melt below 1,300-1,350° make a very good power house coal because the ashes remain in small particles, form small clinkers and do not fuse together into a big sheet of slag over the grate. It is proposed to incorporate high fusibility of ash in future coal specifications. Large consumers of New York, Chicago and Boston favor this move.

Melting Points of Refractory Materials.

By W. H. Barr, "Industrial Engineering" via "Gas Journal," 139, 236 (Aug. 7).—The melting point of fire brick is stated by the author to be the lowest observed temperature at which it begins to exhibit transition from a rigid, to a fluid condition, but the crushing strength cold, behavior under load when heated, and resistance to fluxes may also be regarded as important practical considerations. The melting points of forty-five samples of fire brick, clay, banxite, silica, magnesia and chromite were determined in an electric furnace, the temperatures being measured by an optical pyrometer. It was found that all commercial silicas melt as low as 1,600° C., but are so viscous that they do not change their shape until considerably hotter, 1,750° C. has been determined as the temperature at which they flow distinctly. Banxite when heated is decomposed into Al_2O_3, which melts at 2,012° C. The brick, however, did not approach that point. A brand of magnesia brick melted at 2,165° C. Among the pure materials tested were kaolin melting at 1,740° C., silica at 2,010°, and chromite at 2,180°.

Emergency Cutting and Welding.

Eugene Tregidgo of the Pacific Gas & Electric Co., San Francisco, submitted the following suggestion for emergency cutting and welding. A 16" by 24" nipple was all that was on hand (threaded both ends). Much time and expense would be spent to obtain a 16" by 18" nipple that was necessary to finish job. An oxy-acetylene welding and cutting outfit was handy; two cuts were made, six inches apart in center of nipple. The two threaded pieces, nine inches long were then butt welded together, making nipple of desired length for small cost. The time consumed was one hour and thirty minutes.

Manufacture of Breeze Briquettes.

By G. F. Zimmer, "Gas World," 67, 91 (Aug. 11).—The writer describes a method, which he states has been used successfully. The breeze is mixed with finely powdered pitch in the proportion of 92 per cent. breeze and 8 per cent. pitch. The breeze and pitch are thoroughly mixed and while the mixing is going on superheated steam at 350° C. is admitted to the receptacle. The powdered pitch melts and blends with the breeze. In this state the mixture enters the press. The warm briquettes as they leave the press are sufficiently firm to be handled with coke forks and upon cooling they become still harder. The secret of success is said to be the perfect mixing of the pitch and breeze to a homogeneous substance, instead of the employment of a more or less superficial binding substance. The first plant of this kind is said to have been installed at Riga, Russia, in 1907 and to have paid well.—D.

Gas Tanks for Motor Vehicles.

By H. W. Saville. "Gas Journal," 139, 280 (Aug. 14); "Gas World," 67, 110 (Aug. 18).—The writer describes the "Safe" gas cylinder manufactured by S. J. Murphy for the storage of gas on motor vehicles in place of the gas bags or cast steel tanks which have been used in some cases. This tank is not as unsightly as a gas bag and is claimed to possess the following advantage over cast steel cylinders: (1) It is designed to carry higher pressures; (2) it is much lighter, because being made from drawn and rolled steel it has higher tensile strength and is perfectly uniform, and every ounce of metal is applied usefully; (3) owing to its elastic construction it will yield under shocks which would burst a cast steel cylinder; (4) it is cheaper to manufacture. It is claimed that the tank will withstand almost any practicable pressure with a reasonable margin of safety. Cylinders six inches in diameter for pressure from one pound to 10,000 pounds per sq. inch are quite practical. The cylinder can be made from any high tensile material which is unweldable or will not solder and which derives its high tensile strength from rolling. The cylinder is composed of thin weldless metal tubing, wound spirally with steel tape or ribbons in opposite directions. At each end of the tube are steel ferrules or rings. The ends are closed by steel caps connected with high tensile steel wires.—D.

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Light Oil Recovery from Gas

Principles Underlying Benzol and Toluol Recovery—Construction and Operation of Such Plants Discussed in Detail—Various Processes Available

By U. S. Bureau of Standards

This report has been prepared by the Bureau of Standards in response to the numerous inquiries for information regarding recovery of light oils and the refining of toluol. It has been submitted to, and revised in accordance with suggestions of, the committee organized under the chairmanship of Dr. E. B. Rosa of the Bureau of Standards at the request of the conference which met at the Bureau July 31, August 1 and 2. This committee consists of representatives of the public service commissions, municipalities, manufacturers of gas and makers of toluol recovery equipment. This report has been given to THE GAS RECORD for publication in advance of its general distribution.

The constituents of illuminating and fuel gas which are important in the manufacture of explosives at the present time are benzol and toluol, especially the latter. The removal of these constituents from the gas which is a by-product of coke-oven plants has been practiced for some time. Plants manufacturing city gas, however, have not generally removed these substances from the gas since they contribute to its light and heat giving qualities and the substitution of other substances to maintain the gas quality up to prescribed standards has not usually been considered profitable. Even now, although several months have elapsed since the United States entered the war, comparatively few city plants are equipped to recover these materials, but the prospects are that in the near future they must do so if the requirements for high explosives are as great as is anticipated. Major Burns of the ordnance department at the conference held at the Bureau of Standards on August 1 stated that the army is dependent upon toluol for the manufacture of T. N. T. for shell filler. The amount of toluol needed depends upon the number of men engaged and how engaged. The present estimates are that toluol for shell filler will be needed in the coming year for our own army, for the allies, and the navy at a rate considerably in excess of the present or anticipated supplies from works under construction. There is at the present time about four million pounds per month of T. N. T. nitrating capacity and sufficient toluol is not now available to utilize it; it is therefore now impossible to place more orders for T. N. T., primarily because more toluol is not available. It is probable that any and all explosives, including the picrates, will be necessary eventually.

The importance of high explosives in the present war has been amply demonstrated. While nearly all kinds of explosives are used in some way, those which are most in favor for filling high explosive shells are manufactured from benzol and toluol, which substances have their most important commercial source in manufactured gas of one kind or another. The gas industry thus becomes directly and vitally connected with the conduct of the war, and a survey of the demands which will be made upon it and its preparedness in a technical way to meet these demands, is very important at the present time.

Manufacturing Processes in Use.

The manufactured gas distributed in the United States is of three principal kinds: Coal gas, carburetted water gas and oil gas.

The manufacture of water gas consists essentially of an intermittent process in which a bed of anthracite coal or coke is brought to a high temperature by an air blast and then steam under pressure is blown through the fuel forming carbon monoxide, hydrogen and a small amount of carbon dioxide, by reaction with the carbon in the fuel. The resultant gas, called blue water gas, has a heating value of approximately 300 B.t.u. per cubic foot and almost no luminosity when burned in an open flame; it is conducted into a fire-brick-lined chamber called the carburetter, which contains staggered

rows of fire bricks, called checker brick heated to incandescence during the blow period. Gas oil or fuel oil is sprayed into the carburetter while the gas is passing through, forming an oil gas which enriches the blue water gas to any desired heating value or candlepower. Another checker-brick-filled chamber, called the superheater, converts most of the oil gas vapors into permanent gases, which will not condense again upon cooling. During the formation of the oil gas certain portions of the hydrocarbons which compose the oil are changed in their composition to form benzol, toluol, and related hydrocarbons, called aromatic compounds. Considerable tar is formed at the same time. This is condensed, scrubbed and washed out of the gas by various means, but usually at a temperature which permits most of the aromatics to go forward with the gas. The sulphur in the gas is metered and leaves the plant at, or slightly above, atmospheric temperature.

The manufacture of coal gas is essentially different from that of water gas. In this process certain classes of bituminous coals are distilled in fireclay or silica retorts or ovens, and the resulting gases are condensed, scrubbed, washed, and purified to remove water vapor, tar, ammonia and sulphur. As in the water gas process, certain of the hydrocarbons given off by the coal are transformed by the heat of the retort to aromatic compounds. A small part of these aromatics are washed out of the gas by the wash water and tar, but the larger part remains in the gas; in fact, the cooling of the gas is usually so regulated that most of these substances will remain in the gas to increase its heating value and candlepower. Coal gas retorts take a variety of forms. Among these are coke ovens, chamber ovens, horizontal D-shaped retorts, vertical retorts, inclined retorts, etc. Even those of a given class differ among themselves in details of construction. In most of them the distillation is an intermittent process, but some continuous methods are used. In all these processes the gas produced consists of the same constituents in somewhat different proportions. The form of apparatus used in a given case depends largely upon economic considerations or is governed by certain special qualities which are desired in one or more of the products produced. In all of these coal gas processes, coke remains in the retort after distillation. In some of them, as, for example, in coke ovens, coke is the principal product; but in city gas plants, gas is the chief product. The operation is carried out in any case to give most satisfactory qualities to the principal product and at the same time obtain as high yields and good quality as possible of the secondary or by-products.

Mixed gas is usually understood to be a mixture of carburetted water gas and coal or coke-oven gas. It is supplied in many cities of the United States where the requirements permit of a mixed gas being supplied. The manufacturing installation for mixed gas is practically two complete installations, one for coal gas and one for carburetted water gas, with their auxiliary scrubbing, condensing, purifying and metering apparatus entirely independent and separate. The manufactured mixed gas, however, is stored in common holders and delivered through a single distribution system. The coal and water gas thus supplement each other. The uniform, but more cumbersome coal-gas production furnishes coke as fuel for the water-gas plant; this in turn takes care of the irregularities of the output and where necessary increases the quality of the gas production, especially where a high candlepower standard is in force.

The oil-gas process is at present confined chiefly to the Pacific Coast states, where comparatively cheap oil and expensive coal make the coal- and water-gas processes less feasible. In oil-gas manufacture, oil alone is used as fuel for heating the checker bricks of the fixing chambers and oil is sprayed by steam into the chambers where in contact with the bricks, lampblack and permanent gases are formed. In this process also, aromatic compounds are included among the constituents of the gas.

Light Oils in Various Gases.

The amount of benzol and toluol formed in any one of these processes is by no means definite. It depends upon the operating conditions and the quality of the raw materials (coal or oil.) It would therefore be impossible to predict exactly what the yield in a given case would be, but an extensive inquiry into the operation of several typical plants has given the following approximate figures for the various processes. These figures are averages of the results obtained in twelve plants; individual results may vary widely from them in a particular case:

APPROXIMATE YIELD OF CRUDE LIGHT OILS.

Horizontal-retort coal gas, per short ton of coal carbonized	3 gals.
Coke-oven gas, per short ton of coal carbonized	2.6 gals.
Continuous vertical-retort coal gas,* per short ton of coal carbonized	1.8 gals.
Carburetted water gas, volume of gas oil used	10%

COMPOSITION OF CRUDE LIGHT OILS

	Benzol	Toluol	Solvent Naphtha, Wash Oil, Naphthalene, etc.	Paraffins
Horizontal retort coal gas	38%	16%	46%	**Less than 2%
Coke-oven gas	55%	14%	31%	**Less than 2%
Carburetted water gas	42%	25%	33%	**Less than 2%
Continuous vertical-retort coal gas*	15%	15%	58%	12%

YIELD OF PURE PRODUCTS.

	Benzol	Toluol
Horizontal-retort coal gas, per short ton of coal carbonized	1.32 gals.	0.45 gals.
Coke-oven gas, per short ton of coal carbonized	1.47 gals.	0.35 gals.
Continuous vertical-retort coal gas,* per short ton of coal carbonized	0.27 gals.	0.26 gals.
Carburetted water gas,*** per 1000 cu. ft. of gas	0.15 gals.	0.07 gals.

*Results from only one continuous vertical installation included here.

**This amount may be exceeded under some operating conditions, but paraffins can usually be kept down to this figure except in unusual conditions or with certain fuels.

***The yield is variable according to amount of oil used in manufacturing the gas, being equivalent to about 2.0—2.2% of the gas oil used in the plants investigated, but perhaps only about 1.6% in many cases.

No specific data are available for the amounts of toluol present in oil gas, though it is understood that the oil gas distributed on the Pacific Coast contains at least as much toluol as does coal gas.

Assuming that a ton of coal gives 10,000 cubic feet of gas and that 3.5 to 4 gallons of gas oil are used per 1,000 cubic feet of carburetted water gas, it is evident from the table that the amount of toluol obtainable per 1,000 cubic feet of rich water gas is considerably greater than that obtainable from coal or coke-oven gas.

Prospective Toluol Sources.

It does not seem likely that it will become practicable in the near future for plants having outputs less than 100,000,000 cubic feet per year to recover light oils. A survey of plants of that size and larger indicates that there are about 112 plants having an aggregate annual gas output of about 135-billion cubic feet, of which about 97 billions are water gas, 25 billions coal gas, and 13 billions oil gas. What annual output of toluol could be expected from washing all this gas is problematical. It seems, however, that at least 0.05 gallon of toluol per 1,000

cubic feet of gas could be expected, which would give a prospective toluol recovery from all these companies of about 7,000,000 gallons per year. It seems likely that with an adjustment of standards the benzol production from the same amount of gas would be between three and four times as much as the toluol production, or approximately 18,000,000 gallons. These yields are by no means the maximum obtainable, since the production in some existing plants is higher than 0.05 gallon of toluol per 1,000 cubic feet. A few of the plants included in this estimate are already recovering part of their toluol and benzol, but by far the greater part of the available supplies are not yet recovered.

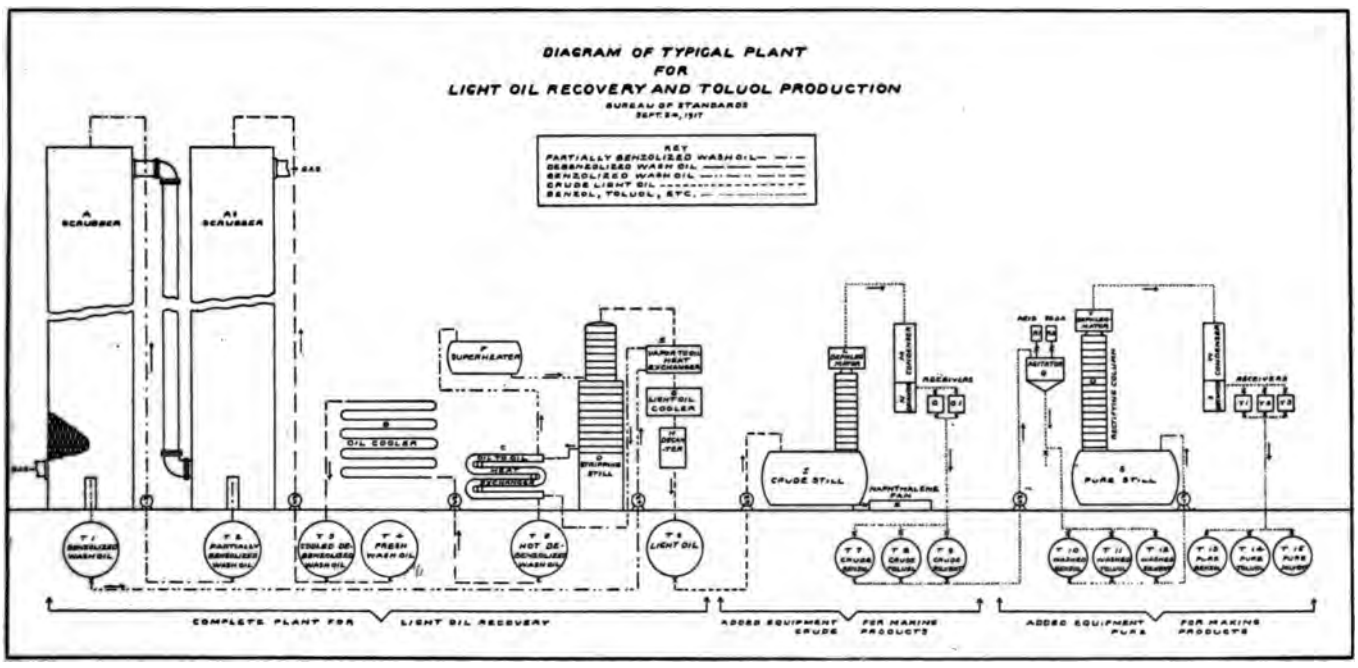
Plant Operating Conditions.

Benzol, toluol, and the related hydrocarbons, which collectively will be designated as light oils, are present in city gas as condensed vapors and are associated with other hydrocarbons of the olefine and paraffin series which possess many physical properties similar to them. To separate some of these substances, especially the paraffins, from the light oil by commercial methods is well nigh impossible and therefore it is important so to control the conditions of gas manufacture that as little of these substances will be present in the light oils as is possible. The presence of more than two per cent. of paraffin compounds in toluol is said to make it unfit for the manufacture of explosives. Only by careful attention to the temperatures and other operating conditions maintained in the gas making process and by the use of suitable raw materials can the gas manufacturer be certain that the toluol obtained from his light oils will be salable; for example, in the recovery of light oils from water gas not only the temperature but the rate of oil injection, spacing of checker bricks, etc., all affect results. Dirty checker bricks are said to be a very common source of high paraffin content in the toluol produced. The favorable conditions can only be determined by trial in each particular case.

For the successful operation of plants in which partial or total rectification of the light oils is carried out careful technical control seems to be a prime essential. In smaller plants where only light oil is recovered technical supervision should be available in starting the plant and for such a time afterwards as will enable the regular operators to become familiar with the fundamentals of operation and establish a routine. It might be feasible for several small plants within a certain district to retain the services of a technical man who would divide his time among them, and make the more elaborate tests which are occasionally required for successful operation.

Removal of Light Oils from the Gas.

To recover light oils from the gas, the method now almost universally employed is to bring the gas into contact with an oil which has a solvent action upon the light oils. Oil washing of gas is accomplished by a variety of apparatus. In any case to obtain complete absorption it is necessary that an adequate amount of oil at a sufficiently low temperature be brought into contact with the gas. The temperature of the wash oil should not exceed 30 degrees C. (86 degrees F.) The temperature obtainable in practice will, of course, depend upon the facilities available for cooling the oil. It is desirable to have the oil a little warmer than the gas to prevent condensation of water from the gas into the oil which gives trouble in the further stages of recovery. The amount of wash oil circulated through the washers will depend upon the amount of light oil vapors present in the gas, the temperature of the oil, the amount of gas to be washed, and the saturation of the wash oil which it is feasible to obtain. About ten gallons of wash oil per 1,000 cubic feet of gas washed, seems to be an average figure.



The oil now usually employed for this purpose in this country is a petroleum distillate called from its color "straw oil"; some plants use a creosote oil obtained from the distillation of coal tar. The choice seems to depend largely upon which is available in a given case. The qualifications which a wash oil should possess seem to be substantially as follows:

A creosote oil upon distillation should yield not to exceed five per cent. up to 200 degrees C. and not less than 90 per cent. between 200 degrees C. and 300 degrees C. The oil should not contain more than seven per cent. naphthalene and should not show any marked increase in viscosity down to four degrees C. The oil should be as fluid as possible under the working conditions and should have as small capacity for heat as possible.

The characteristics of a straw oil for this purpose, as obtained from some operators, are substantially as follows: (1) Specific gravity not less than .860 at 15.5 degrees C. (2) Flash point in open cup tester not less than 135 degrees C. (3) Viscosity in Saybolt viscosimeter at 37.7 degrees C. not more than 70 seconds. (4) The pour test shall not be over -1.1 degree C. (5) When 500 c.c. of the oil are distilled with steam at atmospheric pressure, collecting 500 c.c. of condensed water, not over five c.c. of oil shall have distilled over. (6) The oil remaining after the steam distillation shall be poured into a 500 c.c. cylinder and shall show no permanent emulsion. (7) The oil shall not lose more than ten per cent. by volume in washing with 2½ times its volume of 100 per cent. sulphuric acid, when vigorously agitated with acid for five minutes and allowed to stand for two hours.

Some operators claim to have successfully used ordinary gas oil or water-gas tar. It is claimed by other operators, however, that when gas oil is used the paraffin and olefine compounds in it are likely to contaminate the light oil and that on account of emulsification this oil soon becomes unfit for use. Water-gas tar, it is said, soon becomes too thick for use and soon leads to serious naphthalene deposits in the distribution system. The advantages claimed for these materials are their general availability and lower cost, and the fact that most gas companies already have adequate storage facilities for these materials.

Stripping Wash Oil.

To separate the light oils from the wash oil in which they are dissolved, some form of still is employed; the difference in boiling points makes possible the separation. In large plants there are used continuous stills, in which steam comes in contact with the wash oil and boils off the light oils. The light oil vapors together with the uncondensed portion of the steam ascend upward through a series of chambers which will be described more in detail later. In their ascent they come in contact with descending wash oil carrying light oils which they assist in freeing. The light oil vapors, together with some steam, naphthalene, sulphur compounds, etc., pass away from the still and are condensed. Some of the wash oil is also carried along with the light oils and has to be separated in the subsequent treatment. In smaller plants either continuous or intermittent stills may be used.

Refining.

To obtain from the light oils those constituents which are in most demand a further separation by distillation and chemical treatment is necessary. The light oil is distilled in some form of still, usually equipped with a rectifying column and dephlegmator or planer, which will be described in more detail later. The latter apparatus acts as a partial condenser in which part of the vapor is condensed and falling downward through the rectifying column meets the ascending vapors and washes from them a portion of the high boiling constituents. Only the light low-boiling constituents are able to pass the dephlegmator uncondensed. What vapors shall be allowed to pass on to the condensers depends upon the temperature maintained at the dephlegmator. This temperature is regulated according to the particular oil which it is desired to separate from the light oil mixture at any particular stage of the distillation. By the use of the dephlegmator and rectifying column it is possible to obtain much more definite separation of the bonzol, toluol, and other aromatics than would otherwise be possible. In making the first distillation of the light oil, it is usual to collect the distillate in three successive portions or fractions, making the "cuts" at predetermined temperatures. The first fraction is collected in containing vessel or receiver until the temperature at the top of the still is 100 degrees C. This fraction is called crude benzol, since benzol is its chief constituent. The flow of distillate is then diverted into another receiver and collected until a temperature of 120 degrees C. is reached. This fraction is termed crude toluol, from its chief component. The fraction collected above 120 degrees C. is called crude solvent naphtha, from the use to which it is put, as a solvent of various materials. The boiling point of pure benzol and pure toluol are 80 degrees and 111 degrees C., respectively. It will be noted that one of the changes of fractions or cuts is made midway between these boiling points, while the boiling point of pure toluol is midway between the other cuts.

That the first separation is by no means complete is shown by the following analysis, which is typical of a crude toluol fraction:

Benzol	11.1%
Toluol	64.4
Solvent	8.9
Residue, etc.	15.6
	100.0

The above procedure is not universal. Some operators collect the crude benzol and toluol together and subsequently separate them. Some of the impurities present in the crude fractions have boiling points so close to those of benzol and toluol that they cannot be separated from them by distillation. To remove a certain class of these compounds, called olefines, the fractions are washed successively with strong sulphuric acid, caustic soda and water. The olefines form a thick tarry mass which settles out by gravity upon standing and is drawn off. The fractions are then redistilled in stills with very high rectifying columns and fractions are finally obtained which boil within a single degree of the temperatures which have been determined as the boiling points of pure benzol, toluol, etc.

Some operators prefer to distill the toluol fraction from water gas light oils in a still without a rectifying column, previous to final distillation in a column still. The vapors from the still in this case pass directly through a condenser, coming out in liquid form. This liquid passes upward through a tank containing a solution of caustic soda. By this process any sulphonated olefines which remain in the toluol are removed. Otherwise they would be broken up in the column still and have a destructive action on the dephlegmator and condenser. The condenser coil and connections of this intermediate still should be made of lead.

The final distillates are considered as substantially pure materials if their specific gravities also agree with those which have been determined for the pure constituents. If, however, the specific gravity is lower than that of the pure benzol or toluol it is indication of the presence of paraffins, and to a certain extent the lowering is a measure of the amount of paraffins present.

It is understood that there is no commercially feasible way of separating these paraffins; and in the case of toluol, if the amount exceeds two per cent the toluol is unfit for the manufacture of explosives. It is stated by some operators that by regulating the speed of distillation it is sometimes possible to make the paraffins distill into other than the toluol fractions, even when present in excess of the crude toluol; but the real remedy is to adjust the gas-making conditions so that the paraffins will not be produced. It is evident that special knowledge and skill are necessary from beginning to end of the recovery process.

Effect on Gas Quality.

(a) Oil Washing.—As has been stated above, the removal of benzol and toluol from the gas reduces its heating value and candlepower. The amount of reduction will depend on the original quality of the gas before

washing, the thoroughness of washing, and the process of gas making employed. Operators of benzol recovery plants differ considerably in their opinion as to just what the average reduction would be, but the general opinion seems to be that the complete removal of light oils from gas results in reduction of at least 50 per cent. in the open-flame candlepower and from 1½ to 8 per cent. in the heating value (averaging about 5 per cent.). Various operators have endeavored to establish ratios between light oil removal and heat reduction. One operator states that for every 0.1 of a gallon of light oil removed per thousand cubic feet of gas, the heating value will be reduced between 13 and 14 B.t.u. per cubic foot and the candlepower between 2½ and 3 candles. Another states that the reduction of heating value is 10 B.t.u.

J. W. Shaeffer, manager of the Milwaukee Coke and Gas Co., who has made some studies of the subject, states that the following expression gives very closely the heating value of oil washed coal gas:

$$\frac{a - 121827\ b}{1 - 35\ b}$$

in which (a) is the heating value of the gas before washing, (b) is the number of gallons of light oils removed per cubic foot of gas washed and 35 is the number of cubic feet of vapor per gallon of light oil. The constant 121827 is the product of 17567 (the heating value per lb. of the light oils), 7.3 (the weight per gallon of these oils), and 0.95 (a factor to correct for the amount of wash oils in the light oil, which is assumed to be five per cent.). From calorimeter tests he concludes that the theoretical loss is practically the same as the actual loss.

(b) Re-enrichment.—If it is desired to recover toluol and still maintain a fairly high standard of gas quality, various methods may be employed, as follows: (1) The light oils may be entirely removed from the gas, fractionated, and the benzol fraction returned to the gas by some suitable method. (2) The gas may be only partially washed of its light oils by the use of insufficient wash oil for complete removal of the light oils. (3) All the light oils may be washed from the gas and no portion returned, the enrichment up to the desired quantity being accomplished by the addition of volatile petroleum distillates.

The decision as to which method should be employed in a given case would depend upon several considerations. A partial scrubbing of the gas by process (2) would be most convenient for plants which did not fractionate its light oils, but the possible toluol recovery would be considerably less than in methods (1) and (3). Method (3) would require the purchase of petroleum distillates, the price of which might make the method unprofitable. It is stated by some operators that more distillate must be added to gas than the quantity of light oil removed to compensate for their removal, especially where a candlepower standard is in force, since petroleum distillates do not contribute to the open-flame candlepower to anything like the extent that benzol does. In order to have the re-enrichment effective the distillate would have to possess certain qualities. One operator states that it should volatilize completely below 150 degrees C. and have a heating value of at least 23,000 B.t.u. per lb.

The gas quality standards in force in a given locality would also to a considerable extent determine the method of re-enrichment and the toluol yields obtainable. A company which is operating under a very high candlepower standard is forced to re-enrich heavily or to be satisfied with a small toluol recovery. A lower standard obviates this difficulty to a considerable extent. One operator in a large city which maintains a 22-candlepower standard, states that a plant now making gas of that quality could, if relieved of the candlepower requirement, still maintain over 600 B.t.u. with a recovery of 0.05 gallon toluol and 0.08 gallon benzol, even though no light oils were returned to the gas. In plants making other gas qualities, the yields of toluol and effect upon gas quality would, of course, be different.

Figures as to the value of the light oils in water gas from various plants indicate that for medium candlepower gas, viz., 12 to 17 candles, 0.1 gallon of benzol per 1,000 cubic feet returned to the gas raises the candlepower about two candles. The effect on the heating value in these particular cases is not known, but it seems probable that Mr. Shaeffer's conclusions would also apply in these cases. This would give about 12.2 B.t.u. per cubic foot as the increase in heating value due to the addition of 0.1 gallon of benzol per 1,000 cubic feet of gas.

Types of Scrubbers.

The apparatus in which the gas is brought into contact with the washing oil is known as the "scrubber" or benzol washer. In different plants it assumes different forms; that is, it may be of the rotary type, some form of bubble type, the spray type, or the tower and hurdle type, this latter being in use in most of the plants at the present time.

(a) *Rotary Scrubbers.*—A rotary scrubber may be constructed somewhat as follows: The shell is of cast iron approximately cylindrical in shape, with the axis parallel to the floor. It is divided into a number of compartments by means of plates which are the full size of the cross section of the shell and which have circular openings at their centers; a second set of plates placed alternately with the first reach from the bottom of the shell. The shell is traversed lengthwise by a shaft, the axis of which coincides with the axis of the shell, and which is supported by suitable bearings on the end plates and on the second set of cross plates mentioned above. On the shaft are fastened gas baffles in the form of discs made up of wooden slats, there being one disc for each compartment of the shell, built up so that the gas can travel between the slats either from circumference of the shell to the center or vice versa, but not straight across the discs parallel to the shaft. The central openings of the discs are alternately closed and opened in such a manner in conjunction with the arrangement of the cross plates that, when the scrubber is filled with the washing medium to the proper level, the gas is forced to travel through the upper half of the discs from circumference to center and from center to circumference, alternately. A small engine, or some other motive power is used to rotate the shaft and the attached discs. The spaces between the slats are very narrow, and thus the gas in passing through the scrubber flows in thin streams over surfaces which are kept continually wet as the shaft rotates by dipping into the washing medium in the lower part of the shell. The washing medium is admitted to the end opposite that at which the gas enters, and is carried by suitable overflows from one end compartment to the other until it finally leaves the scrubber at the gas-inlet end. In this way the gas most nearly washed comes into contact with the freshest oil.

(b) *Bubble Type Scrubbers.*—A scrubber of the bubble type usually consists of a series of superimposed sections, one mounted upon the other, and constructed of cast iron. Each section has a circular opening raised above its bottom, and covered with a hood or bell, the edges of which are serrated, so that any gas flowing through the opening can only pass out under the edge of the hood, which edge is kept sealed with the washing medium. Likewise an overflow for the washing medium is provided for each section. The gas enters the bottom of

the washer and passing up, bubbles through the seal of wash oil in each section. Fresh wash oil is introduced at the top, and fills the top tray to the height of the overflow pipe, through which it drains to the next section. The process is therefore so arranged that the gas most nearly washed is brought in contact with the freshest oil.

(c) *Spray-Type Scrubbers.*—In the spray-type of scrubber the wash oil enters the top section of a series of superimposed sections through a syphon and passes through a spraying cone by which it is hurled by centrifugal force out through the perforations in the cone in a very fine mist or spray, thus filling the entire gas space with a mist of wash oil. The oil flows in to the next lower section through the gas ports and is again brought into contact with the gas in the same manner here, finally leaving the bottom of the washer in a saturated condition. The gas enters from the bottom and passes upward successively through the washing section. The power supplied to the centrifugal spraying cones is furnished by a small steam engine.

(d) *"Hurdle-Tower" Scrubbers.*—The hurdle-tower scrubbers are the most common type used at the present time; they usually consist of cylindrical steel shells about six to seven times as high as the diameter. Two such shells are shown as A and A1 on the diagram. These shells contain a great number of grids or trays, commonly called "hurdles," made of white-pine slats five or six inches high by one inch wide. Except for spaces at the bottom and top of the scrubber, these grids are practically superimposed one upon the other, with the openings staggered, separated by small spacing strips. At the top of the tower the wash oil is sprayed in from a number of nozzles; after passing through the interstices in the grids it collects at the bottom in a reservoir. The gas enters the tower at the bottom and rises through the interstices in the grids by this means coming into intimate contact with the washing medium. Thus the freshest wash oil, introduced at the top, comes into contact with the most nearly washed gas.

In one plant designed to scrub about 10,000,000 cu. ft. of gas per day in which the tower is about 75 feet high and 11 feet in diameter, there are 84 grids, arranged in 4 banks of 21 each. The space at the bottom of the tower is about eight feet high; that at the top is about five feet. Spaces of about three feet separate the various sets of trays. In the top are 12 oil nozzles. The foundation of such a tower is constructed of concrete and extends down about seven feet. The size of the washer is, of course, dependent upon the capacity of the plant; 30 cu. ft. of scrubber capacity per 1000 cu. ft. of gas washed per hour is a figure given by some engineers. In some plants, notably in those utilizing existing tanks or towers, the grids are replaced by trays on which coke is piled, or by one tray set near the bottom of the tower on which coke is piled to nearly fill the tank.

The wash oil is pumped by a circulating oil pump from the oil storage tank T4 or circulating tank T3 to the nozzles in the top of the scrubber. From these nozzles the oil is sprayed into the scrubber at a temperature of 30° C. or lower. When several scrubbers are required, they may be arranged either in series or in parallel. In the former case the wash oil which has passed through one scrubber is pumped to the top of the next scrubber and flows down through this scrubber also. The gas passes from the top of the first scrubber to the bottom of the second and up through the second scrubber in the same manner as previously described. In those plants in which the scrubbers are arranged in parallel, each scrubber acts as an individual unit. An additional oil pump is required for each tower scrubber which is being used.

Heat Exchangers.

In order to utilize the heat which would ordinarily be wasted, several pieces of apparatus known as heat exchangers or interchangers may be used. One of these is known as the "vapor-to-oil" and the other as the "oil-to-oil" heat exchanger. Each of these may assume a different form in different plants, or the order of succession may be different; in some plants one or the other may be eliminated, and in very small plants, especially those which are home made, both are frequently missing.

(a) *Vapor-to-Oil Heat Exchanger.*—The wash oil containing the light oils is pumped from the bottom tank of the tower scrubber to the vapor-to-oil heat exchanger, shown as E on the diagram. This piece of apparatus usually consists of a cylindrical steel shell which contains a number of tubes. The outer shell may be twice as long as it is in diameter; in one plant designed to scrub 10,000,000 cubic feet per day it is about eight feet long and four feet in diameter, containing about 150 tubes two inches in diameter. The cold benzolized wash oil flows through the tubes, while hot vapors from the top of the continuous still (hereafter described) pass around the tubes, being directed by a series of baffle plates. At the outlet of this heat exchanger the temperature of the benzolized wash oil is about 72° C. A heavy covering of heat insulating material aids in the conservation of the heat. It is understood that this apparatus is controlled by the patents of a single manufacturer of recovery apparatus.

(b) *Oil-to-Oil Heat Exchanger.*—After leaving the vapor-to-oil heat exchanger, the benzolized wash oil passes to and through an oil-to-oil heat exchanger, shown as C on the diagram. In some plants this apparatus is an oblong box, in which the hot debenzolized wash oil from the still passes through pipe coils, the benzolized oil passing around the outside of these coils. In other plants this apparatus is built up of a number of pipe sections, joined at the ends. Each pipe contains a number of smaller pipes. The hot debenzolized oil from the base of the still passes through the smaller pipes, the benzolized oil passing around them. The larger pipes are arranged in several banks one above the other. The banks are connected together at each level, but the superimposed pipes are only connected in pairs.

In one plant of the size above mentioned this heat exchanger is constructed of eight ten-in. pipes, heavily covered with insulating material. Each of the large pipes contains 14 one-half inch tubes. The overall length is about twenty-six feet, the height about seven feet, and the width about three feet. At the outlet of this heat exchanger the temperature of the benzolized wash oil is about 94° C. and that of the debenzolized wash oil about 87° C.

Superheater.

Passing from the oil-to-oil heat exchanger, the benzolized wash oil enters a superheater, sometimes called a preheater, shown on the diagram as F. This piece of apparatus usually consists of a cylindrical tank made of steel, and is about twice as long as it is in diameter. Inside of the shell are a number of small tubes, and several baffle plates, the benzolized wash oil flowing around, and steam passing through the tubes. In the plant above mentioned this superheater is about ten feet long and four feet in inside diameter; in this shell are about 160 two-in. tubes. The superheater is heavily insulated, and owing to great corrosive action, a duplicate is usually provided. Likewise the parts are so arranged as to be removable without great difficulty. A safety valve is placed on the top of this piece of apparatus. The temperature of the benzolized wash oil leaving the superheater is usually about 145° C., although this temperature varies in different plants.

Continuous Stripping Stills.

After the benzolized wash oil leaves the superheater, it passes into the continuous stripping still, in which the wash oil is freed from practically all of the entrained light oils. This still, shown as D on the diagram, is usually constructed in two main portions, each of which is built up of superimposed individual sections. The total height is usually about four to five times the diameter of the lower portion, while the diameter of the upper portion is usually about three-fourths that of the lower. Each section is made of cast iron, and is from 12 to 14 inches in height. The upper portion of the still usually has about half as many sections as the lower, and acts as a partial rectifying column assisting in retaining some of the wash oil in the still, which might go over with the light-oil vapor. In construction these sections are similar to those described under the "bubble" type of scrubbers, there being a number of openings arranged in a circular manner in each section. However, the edges of the sealing bells are not serrated.

The benzolized wash oil enters the still at the base of the upper portion and passes down through the large portion of the still, rapidly giving up the light oil which it contains. Steam is admitted at the bottom and passes up through the still, bubbling from under the sealing bells of each tray and carrying upward the light oil in the form of vapor from the wash oil which seals the bells. The steam and these vapors pass through each individual section of the still in the manner just described and mingle in the upper sections of the still with the vapors set free there.

In one plant designed for 10,000,000 cubic feet per day the still is about 27 feet high. The lower portion is about six feet in diameter and the upper about 4½ feet in diameter. The lower portion consists of about 12 sections and the upper of about six sections. The temperature of the light-oil vapor leaving the top of this still is about 104° C., while the wash oil, stripped of all light oils, leaves the bottom at a temperature of 130° C. In some types of light oil recovery plants, the light oil vapors after leaving the top of the still column pass through some type of dephlegmator or planer through which a regulated amount of cooling water flows so that while the light oils are permitted to pass uncondensed, the water vapors and any wash oil vapors present condense out and run into a collecting tank. From this tank the water is drawn off and the wash oil which contains some light oil is pumped again with the benzolized oil into the still or if too heavy to be handled by the stripping still it is sometimes put into the light oil to be subsequently refined in the crude still.

Wash-Oil Cooler.

The debenzolized wash oil leaving the base of the continuous still passes into the oil-to-oil heat exchanger, where its temperature is lowered to about 87° C. From this piece of apparatus the wash oil drains to a hot oil drain tank T5, after which it is pumped through a wash oil cooler, shown as B on the diagram. This consists of a number of pipe coils, the cooling water being showered upon the outside of the coils, while the wash oil flows through the inside. In the plant above mentioned, these coils are made up of two-in. pipe with return bends at the ends, the whole being about ten feet high. At this plant there are six of the sets of coolers parallel to each other. In some types of recovery plants the wash oil cooler consists of pipe coils immersed in a tank of water. This apparatus is sometimes designated as the temperature regulator, since it determines the approximate temperature at which the oil is to enter the gas scrubbers. From these coolers the wash oil passes to a wash-oil storage tank shown as T3, from which it is pumped to the top of the tower scrubber to again pass through the system. In some plants the wash oil may be pumped directly from the oil-to-oil heat exchanger through the coolers, and into the wash oil circulating tank.

Condenser and Separator.

The crude light-oil vapors leaving the top of the continuous still with a temperature of about 104°C. pass into the vapor-to-oil heat exchanger before described. From here they pass into a condenser, shown as G on the diagram. This condenser is usually of cylindrical shape, being about 2½ times as long as it is in diameter. Inside of the outer shell are a number of tubes into which the vapors pass and in which they are condensed to liquid form by water passing around the tubes. The light oils leaving the condenser have a temperature of about 30° C. In the plant under discussion this condenser is about nine feet long and four feet in diameter. In many large plants it is found advantageous to install a pipe connection with a small blower or steam jet between the outlet of the light oil condenser and the outlet of the last gas scrubber. By this means a considerable amount of non-condensible olefines leaving the stripping still may be returned to the gas thereby reenriching it to a considerable extent.

From this condenser the light oil enters a separator, or decanter, shown as H on the diagram. Here any water entrained in the light oil is decanted or separated due to the difference in specific gravity. This piece of apparatus usually consists of a small cylindrical shell provided with two outlets, one for oil and one for water. The water connection extends down inside of the shell nearly to the bottom, the oil outlet being close to the top. The water passes off to a sewer and the crude light oils pass either to a crude light oil storage tank, shown as T6, or directly into the crude rectifying or "boiler" still, if the plant is so arranged as to do away with this tank.

Crude Rectifying Stills.

From the crude light-oil storage tanks, the crude light oil is pumped into the crude rectifying still, or boiler still, this still is composed of three parts, the boiler, shown as I on the diagram, the rectifying column K, and the dephlegmator, L. The boiler still consists of a cylindrical shell having bumped heads, internally braced; it is designed to handle from 5,000 gallons to 12,000 gallons of crude light oil, according to the size of the plant. The shell is covered with insulating material in order to reduce heat losses. The distillation is carried out by the use of live steam, this being introduced into coils placed in the bottom of the still. There is also a perforated pipe in the bottom of the boiler so arranged that live steam can be utilized to aid in the distillation, although this latter is not frequently made use of. Vacuum connections are also provided so that the distillation may be aided in the latter part of the cycle.

In a plant designed to wash 10,000,000 cu. ft. of gas per day this still, designed to handle a charge of 5,000 gallons of crude light oil, is made of steel, 7 feet 6 inches in diameter and 16 feet long, over all. The steam coils are made of two-in. pipe, and a ball and lever safety valve is attached to the shell. The crude light oils are pumped into the boiler still until its capacity is reached, the distillation being carried out at the temperature previously described. The residue which remains in the still is known as the still residue, and consists of wash oil, naphthalene, etc. It is drained to the naphthalene pans which are described later. After the charge is fractionated a fresh charge is placed in the still. The time required to complete a run varies; in some plants 40 hours are required, while in others 24 hours are deemed sufficient.

The vapors from the still pass into the rectifying column, shown as K on the diagram, as they are distilled off. This column consists of a number of cast iron sections, mounted one upon the other, each section being from 12

inches to 14 inches in thickness. It is mounted upon the top of the boiler still close to one end, and is usually about three times as high as it is in diameter, being heavily lagged with insulating material. In construction, each section is similar to those already described. There are six "up" openings in each section, the covering bells having their edges serrated. The vapors rise through the openings and bubble through a seal composed of the heavier portions of the descending oils which are condensed in the dephlegmator and which drain back down the rectifying column.

In this plant this rectifying column is about 12 feet 6 inches high and four feet in diameter, and is built up of ten sections. Mounted on top of the rectifying column is the dephlegmator or planer shown as L on the diagram. Here the vapors rising from the rectifying column are cooled by a circulation of water. The heavier portions condense and drain back down the rectifying column as before described.

The dephlegmator usually consists of a box shaped shell about two-thirds as high and wide as it is long, containing a number of water tubes. Baffles direct the course of the vapors through the dephlegmator. In this plant the dephlegmator is about 5 feet, 6 inches long and 3 feet, 6 inches high and wide, and it contains about 148 water tubes each 1.3 inch in diameter.

In another plant one rectifying column and dephlegmator is provided for two boiler stills. By this means a continuous flow of light oil vapors is obtained.

In some cases the crude rectifying still and stripping still may be combined. In plants producing from 15 to 40 gallons of light oil per hour (about one to three million cubic feet of gas per day) it may be found advantageous to have the stripping still of such size that it can strip in, say, 16 hours all the benzolized wash oil produced in 24 hours and to have such accessories to the still provided that it can be used as a crude rectifying still during the remaining eight hours of the day. When a still is to serve both purposes it should usually be equipped with some form of dephlegmator, or planer, and with an auxiliary still base which can be valved off and used as a light oil storage tank while the still column is stripping wash oil. This still base is equipped with closed steam coils and a live steam connection and is so connected with the still column that when in use rectifying light oil, it corresponds in effect to the boiler part of a regular rectifying still. In plants producing more than 40 gallons of light oil per hour, it would probably be more practicable to have entirely separate rectifying and stripping stills. In plants producing less and probably in some producing more than 15 gallons of light oil per hour when advantageously situated, it would usually be impracticable to attempt fractionation of the light oil at all at the gas works.

Naphthalene Pans.

The still residue, containing wash oil, naphthalene, etc., is drained from the bottom of the boiler still into the naphthalene pans, shown as Z on the diagram. Here the naphthalene separates out on cooling in the form of crystals and the wash oil drains back to the circulating wash oil tank. The naphthalene may be further dried by using a centrifugal machine. In plants scrubbing the light oils from water gas, no naphthalene will usually be encountered.

Condenser and Separator.

The benzol, toluol, and solvent naphtha vapors leaving the dephlegmator enter a condenser, shown as M on the diagram. This is a cylindrical tank about three times as high as it is in diameter. Inside are a number of tubes through which water circulates; a series of baffle plates direct the flow of vapor around the coils. In this condenser the various light-oil vapors are condensed into liquid form. In the plant above mentioned, this equipment is about 8 feet 6 inches high and three feet in diameter, and contains about 90 tubes, each 1½ inches in diameter. From the condenser the benzol, toluol, etc., pass to a water separator, shown as N on the diagram, which is similar to the one described above.

Receivers or Sampling Tanks.

From the separator the benzol, toluol, etc., drains into one of two receivers, shown as 0 and 01 on the diagram. These are small graduated cylinders of about 100 gallons capacity, and are used as sampling tanks. One may be filling while a sample from the other is being tested to determine its character. From these receivers the crude benzol, toluol, and solvent naphtha is drained into the proper one of the crude storage tanks, shown as T7, T8, and T9 on the diagram.

Agitator.

If the plant is one which produces chemically pure products, the crude benzol, toluol, or solvent naphtha is pumped from the crude storage tanks into an agitator shown as Q on the diagram. This agitator consists of a large lead-lined, vertical, cylindrical, steel vessel nearly as high as it is in diameter. It has a conical bottom, and contains power driven paddles. In one plant the agitator is about 8 feet in diameter and 6 feet high.

In the agitator the benzol, or toluol, etc., is washed with sulph which is supplied from a sma tank shown as R on the dia paddles are located at a hei permits of discharging the a bottom of the washer near th the benzol or toluol, and the tion of it in such a manner tain a thorough mixture. Th or washing is carried out fo minutes, after which the a shut down and about 30 mi allowed for the used acid to the bottom of the agitator. is used to separate the u hydro-carbons, principally which settle with the resid bottom of the agitator. The run off and the acid contain regenerated for further use. zol or toluol is washed wi after which a caustic soda s run into the agitator to neut remaining traces of the ac benzol or toluol. This latte is stored in the tank shown the diagram. After proper with the light oil the soda i to settle and is then draine benzol or toluol being agai with water to remove any caustic soda. From the w washed benzol, toluol, o naphtha drains into the tanks, shown as T10, T11, ar the diagram.

Rectifying Still.

From these tanks the wash toluol, or solvent naphtha i into the pure rectifying still. consists of three parts, the b shown as S on the diagram, fying column, U, and the dep V. Each of these three pa the same function and is construction to those describ crude rectifying still. How rectifying column is usually a half again as high as that on still, in order that closer fra can be accomplished. If ben troduced into the still, pure distilled over at a temperatur 80° C. and 81.5° C. If toluo duced into the still, pure toluc till over between 110° C. and The time of distillation is usu five times as long as in the c and the size of the still i greater.

The residue is usually retur tanks containing the washed while the vapors leaving the mator pass through a condens as W on the diagram, and the a water separator, shown as two pieces of apparatus are all respects to those describ From the separator the "C. P toluol, or solvent naphtha is

one of three sampling tanks, shown as Y, Y1, and Y2, similar to those marked O and O1, after which it passes to the pure tanks, shown as T13, T14, and T15 on the diagram.

Location Relative to Existing Plant.

The relative position occupied by the light oil recovery plant in reference to the remainder of the manufacturing plant varies in different localities. In some plants the washing of the gas takes place before the gas goes to the purifiers, while in others after the gas passes the purifiers. However, in any plant in which quantities of tar and ammonia are produced, the oil washing of the gas should take place after the tar and ammonia are removed. The relative arrangement of the equipment depends largely upon the existing manufacturing plant. If possible, it should be close to the necessary steam and water supplies, and all of the parts should be so arranged that there would be only the minimum of all classes of piping required.

Space Required.

Sufficient space is required for the necessary number of tower scrubbers, if the plant is to be of this type, for the building to house the stills, pumps, and other necessary accessories; and for the storage and circulating tanks and other outdoor equipment. The entire recovery plant should be in as compact form as possible, yet should not be too crowded.

The amount of floor space which is required for the building in which the stills are located, and in which some of the accessories must be placed, depends largely upon the products recovered, and the daily capacity of the plant. Sufficient floor space must be provided for the stills, and the pumps should also be provided for in estimating the amount of floor space required. It is possible to put much of the remaining apparatus at a higher level, thus economizing in floor space. It is impossible to state with any degree of exactness the floor space requirements, but in several plants, from 2,400 to 3,000 square feet of floor area are required for the recovery of "C. P." products. In another plant 1,200 square feet are required for the recovery of crude benzol, toluol, etc.

Storage of Materials.

The question of storage of materials —wash oil, both benzolized and debenzolized, the crude light oil produced in the continuous stripping still, the crude benzol, toluol, solvent naphthas, etc., the refined products, if plant carries the process to this extent, is one which must be considered carefully. Lack of adequate means of storage often means the discontinuance of the plant, unless it is possible to utilize some other equipment in the plant.

In all plants an extra supply of wash oil must be stored. It is advisable to have as a reserve from one-half to the full amount of wash oil circulated through the system in one day. This preferably should be stored in one tank, which should have a capacity at least equal to twice that of a tank car so that the unloading of incoming cars may be done promptly. It is also advisable to have sufficient tank capacity for all the wash oil being utilized in the system, one-half for the benzolized wash oil and one-half for the debenzolized wash oil.

It also is necessary to provide a tank for the light oil recovered from the continuous still. This tank should have a capacity equal to that of the fractionating still unless there are two fractionating stills with one rectifying column, as is the case in some plants. If the plant is not equipped for fractionating the light oil, sufficient storage capacity to tide over any interruption of shipping facilities should be provided; it is suggested that capacity for a week's production should be available, but where practicable the capacity should be not less than twice that of an average tank car.

If the plant recovers crude benzol, toluol, etc., but does not further fractionate these, sufficient storage capacity should be provided to care for each of the crude fractions, so that no danger of a lack of storage will be met. In several plants the storage capacity for benzol is about twice that of the toluol, solvents, etc. It is suggested that capacity for a week's output each of these liquids be provided. If the plant produces "C. P" products, sufficient storage capacity for each of the crude liquids should be provided; so that the pure still will be able to operate long enough to refine the preceding crude fractions.

The "C. P." benzol, toluol, etc., likewise requires sufficient storage space so that if any interference with shipments occurs it will not be necessary to curtail the operation of the plant in any way. Here also the benzol storage should be about twice that for the toluol. In addition, in a C. P. plant storage must be provided for the sulphuric acid. As a summary, approximately the storage capacity indicated is required for the following materials:

When crude light oil only is recovered:

Old wash oil debenzolized—equal to one-half the amount in circulation.

Old wash oil benzolized—equal to one-half the amount in circulation.

New wash oil—from one-half to full amount in circulation, at least two carloads.

Crude light oil—equal to capacity of crude still. If no fractionation, should be large enough to avoid difficulties caused by shipping delays, at least two carloads.

When crude benzol, toluol, etc., are recovered:

Same as above and crude toluol, crude benzol, crude solvent naphthas, heavy naphtha, crude intermediates—benzol storage about twice as great as other fractions.

If further refining is done, should be large enough to allow refining stills to work necessary time. If no refining, tanks should be large enough to avoid difficulties caused by shipping delays.

When "C. P." products are recovered:

Same as previously stated and washed benzol, washed toluol, washed solvent naphthas—benzol about twice as great as other fractions.

Sufficient capacity to allow refining still to operate requisite length of time.

Sulphuric acid: pure toluol, pure benzol, pure solvents—benzol about twice as great as other fractions.

Large enough to avoid difficulties caused by shipping delays. In addition, one or two spare tanks would be advisable.

The location of these tanks is largely dependent upon local conditions. In some plants they are placed underground, in other plants they are located in watertight pits, while in still other plants part or all of the tanks are above the ground surface. They may be grouped together or they may be separated into different groups, largely depending on the amount of available space or local fire regulations.

Safety in Operation.

The buildings for a light-oil recovery plant should be located as far as practicable from other plant structures; or if sufficient distance is not obtainable, owing to existing conditions, the building should be made an individual unit, by bricking up or otherwise closing all openings into adjacent buildings. Under any conditions, it is desirable that the stills be located about 200 feet from any source of flame, since the heavy benzol vapor is quite prone to travel along the ground for a considerable distance without dilution to a sufficient degree to prevent inflammability. The building should be constructed of fire-proof material throughout, and should be well ventilated and equipped with wire glass windows and metal fire doors. If practicable, it should be located away from railroad tracks or sidings, and the loading platform should be removed as far as practicable from the rest of the plant.

No open flames should be brought near any portion of a light oil recovery plant, and only incandescent

electric lamps, encased in vapor-proof globes with a protective wire casting around the globe, should be used around any portion of a light oil plant. In case portable lights are required, small storage battery lights should be used. All electric wiring throughout the plant should be encased in iron pipe conduits, and no extension cords should be used.

A sufficient number of fire extinguishers, of the type capable of extinguishing an oil fire, and buckets containing clean, dry sand should be conveniently placed not only inside of the building, but also outside of the building. A plentiful supply of water, under high pressure, should also be readily accessible, and an efficient corps of men, trained in fire extinguishing, should be available at all times. Smoking should not be permitted in or near the light-oil plant at any time.

All stills and superheaters should be equipped with a positive safety valve set to blow at about ten pounds pressure. Likewise all tank cars and tank wagons should be equipped with safety valves. All tanks should vent to the atmosphere, the vents being provided with a screen of fine wire in order to prevent the ignition of the vapors by sparks. All joints in the piping, stills, tanks, or any other apparatus should be kept tight so that leaking vapors do not accumulate in the buildings or their vicinity. All condensers should be supplied with adequate cooling water to prevent the escape of vapor into the air.

When necessary to clean stills special precautions are necessary to prevent the workmen from being asphyxiated. No one should enter the stills until they have been thoroughly purged of all vapors and are cool. All connecting valves should be closed and locked, and if the valves are not tight, the piping should be disconnected. At least two openings should be maintained in the still to allow a circulation of air throughout. The man entering should be provided with a life belt and rope and another man should be stationed outside of the still to assist in case of necessity. He should obtain additional assistance before entering the still to aid the man overcome by the vapors in the still.

Technical Control.

In the operation of a light-oil recovery plant, in order to obtain efficient results and good quality of product, an adequate laboratory equipment must be maintained and at least one observer, skilled in making the necessary tests, must be employed. The extent of the tests in a given plant will depend upon the final products produced by the plant. Obviously a plant producing pure benzol, toluol, etc., will require much more elaborate tests than a plant selling unrefined light-oil only. The following is a list of tests usually required in the operation of a pure products plant as furnished by the chief chemist of a large operating company:

A. Tests of gas—(1) Determination of light oil in gas entering scrubbers. (2) Determination of light oil in gas leaving scrubbers.

B. Tests for wash oil still operation—(1) Determination of light oil in benzolized wash oil. (2) Determination of light oil in debenzolized wash oil. (3) Tests of the light oil: (a) Boiling point. (b) Determination of wash oil.

C. Tests for crude still operation—(1) Receiver tests; i. e., boiling point tests made to control fractionation. (2) Boiling point tests of fractions (crude benzol, crude toluol, etc.) and residues sampled from their respective storage tanks.

D. Tests for agitator operation—(1) Distillation and acid tests of washed benzols. (2) Tests for SO_2 in washed benzols. (3) Specific gravity of regenerated sulphuric acid.

E. Tests for pure still operation—(1) Receiver tests; i. e., boiling point tests made to control fractionation: (a) boiling point, (b) acid test. (2) Tests of pure products sampled from storage or running tanks or from shipments: (a) boiling point, (b) acid test, (c) specific gravity, (d) freezing point (occasional in case of benzene). (3) Boiling point tests of still residues.

F. Tests of materials used in operation—(1) Wash oil: (a) specific gravity, (b) viscosity, (c) emulsification, (d) cold test, (e) distillation, (f) olefines. (2) Sulphuric acid, specific gravity. (3) Soda—Na_2O.

It is evident that in a plant shipping light oil away for further refining, many of these tests could be omitted. In a very small plant, after the routine was established, occasional tests on gas before and after scrubbing and of the wash oil and light oil would probably suffice.

Recovery in Small Plants.

While the somewhat complicated system of heat exchangers and the careful design of stills, described in connection with the layout of a typical light-oil recovery plant, are very important in effecting economy of operation, they are not absolutely essential to the recovery of this material. The essential equipment of a small plant recovering only light oils consists of some form of scrubber to oil-wash the gas, a still for stripping the wash oil, a condenser for condensing the light oils, and some tanks for the storage of the various materials. A plant which is so fortunate as to possess or to be able to obtain cheaply some old gas-making or power-plant equipment might find it profitable to construct and operate a small plant. An old ammonia washer, water-gas scrubber, shavings scrubber, or even an old water-gas generating shell, could be readily adapted for use as an oil washer by filling with wood grids, coke, or other materials which would furnish a large surface wet with the wash oil for contact with the gas. For a stripping still, an old boiler surmounted by a section of large diameter pipe filled with stones could be used and the process made an intermittent one. In this case tanks would, of course, be necessary so that a portion of the wash oil could be circulated while another portion was being debenzolized and cooled. An old feed water heater of the type in which the exhaust steam comes into direct contact with the cold water might be used as a continuous still, by connecting the top of it with a condenser of some kind and admitting the wash oil near the top and live steam near the bottom. For a condenser, a coil of pipe in a tank of water, an old closed coil-feed water heater, or similar apparatus might be used. In such an improvised plant no fractionation of the light oil would probably be feasible. The light oil would be shipped to a larger plant or to a benzol refinery. In a simple plant of this kind the cool wash oil would be pumped from its storage tank to the top of the scrubber. From the bottom of the scrubber the benzolized oil would flow to a storage tank from which it could be pumped to the still. The hot debenzolized oil from the still would be run into a storage tank to cool while another portion of benzolized oil was being distilled. After cooling it would be again circulated through the scrubber. A fourth tank would be necessary for the storage of the condensed light oil. If sufficient old materials were available, it might be possible to construct crude heat exchangers which would improve the economy of the plant. Whether or not a given small plant should attempt to make crude fractions will depend upon local conditions. In general it does not seem practicable for a plant producing less than 1,800,000 cu. ft. of gas per day to do so.

It would hardly be expected that a simple plant of crude construction would recover the benzol as completely or economically as a large well-designed plant, but a large number of such plants would increase the total benzol and the toluol resources very materially.

In the small plant, as well as in the large one, all reasonable precautions should be taken to make the operation safe both to the operators and to the plant in general. The highly inflam-

mable character of the materials handled and the explosiveness of the vapors when mixed with air should always be guarded against. The benzol plant should be located where in case of fire it will not endanger the rest of the plant. The fact that old equipment is used in the construction should put the operators on the outlook for leaks, which occur more or less frequently even in well-constructed plants.

Time Required and Cost for Plant.

The time required for the construction of light oil recovery plants seems to vary greatly. The two essentials to normal construction are sufficient labor to conduct the work in an expeditious manner, and the necessary material either at hand or arriving at a steady rate to carry on the work in logical sequence. In this period of the shortage of efficient labor and of the congestion of shops and railroads, the period of construction may be prolonged far beyond the normal period or it may perhaps even be halted. Of course the amount of construction and the clearing and preparing of the site necessary are large factors in the length of the construction period even in normal times.

If there is no difficulty in obtaining labor and material, a plant to scrub about ten million feet of gas per day should take approximately three to four months to build. One such plant, recovering C. P. products, actually took 63 days to build. Another plant, recovering crude benzol, toluol, etc., took about four months to build. One plant of homemade construction throughout, and scrubbing about three-fourths of a million cubic feet of gas per day, producing crude light oil, only took 35 days to construct and put into operation.

To present any definite figures as to the cost of installing a plant for the recovery of light oils is impossible. This is particularly true at the present time when the price of labor and materials is steadily mounting. Each plant must be figured as a unit, and the cost is dependent upon a number of factors pertaining to each individual plant. If the plant is to be constructed of apparatus designed for the specific purpose, and practically no old equipment is utilized, it will, of course, cost more than such a plant utilizing existing equipment.

The capacity of the plant, the completeness of recovery, the available steam supply, and the available supply of condensing and cooling water are factors which must be given consideration in any estimate. The steam and water supply capacity especially should have very careful consideration since the requirements of a benzol recovery plant for steam and water are very considerable. Likewise, the location of the plant with reference to the source of material supply is of importance.

Among a number of plants visited no agreement as to cost was obtained. The figures were, in most cases, only approximate; and therefore no great reliance can be placed upon them. The year in which the plant was constructed also had a great bearing on its cost. For example, one plant scrubbing about 11 million feet of gas a day, and recovering "C. P." products, is said to have cost about $200,000, while another plant scrubbing about the same amount of gas, but recovering only crude products, is said to have cost about $225,000 Still another plant scrubbing only 4¼ million cubic feet of gas a day, and recovering C. P. products, is said to have cost about $200,000.

In one plant where some existing equipment was utilized, seven million cubic feet of gas a day is scrubbed, light oil in the crude only being recovered; the cost is said to have been $25,000. Another plant, utilizing some old equipment, and scrubbing about one-half million cubic feet of gas per day, producing only crude light oil, is said to have cost about $40,000. Another plant, made from odds and ends without heat exchangers or any other such devices, and with only a few pieces of apparatus bought, is said to have cost about $10,000 to scrub about 650,000 cubic feet of gas per day.

From the above examples it will be seen that it is impossible to draw any general conclusions as to the cost of a light oil recovery plant. However, it will be seen that an efficient plant costs several hundred thousand dollars, but that the cost may range considerably lower for plants constructed from existing equipment, depending upon the amount of such equipment used.

Items Entering In Cost.

The Bureau is unable to give any estimate of the cost of light oil recovery. This would necessarily vary greatly in different localities. We can only indicate some of the principal items which enter into the cost. These items are raw materials, steam, water, electric power, wages, overhead expenses, fire insurance, maintenance, depreciation, and in some cases cost of reenriching the gas to the prescribed standard of quality.

The materials include wash oil, lubricating oils, packing and repair materials; and in plants producing pure products, sulphuric acid and soda also are needed. The wash oil consumption varies considerably in different plants, depending upon the kind of gas washed, the tightness of the circulating system and the method of operation. While wash oil does not enter into the final product, replacement is necessary at regular intervals due to losses, depreciation of quality, etc. Some operators replace a certain percentage of wash oil each day, while others replace the whole amount at stated intervals. The percentage of loss varies greatly. Operators claim a replacement of wash oil all the way from two per cent to ten per cent of the number of gallons of light oil recovered Prices of wash oil at the present time range, according to information available, from 7½ to 12 cents per gallon. These prices are continually changing, so no definite figure can be assigned.

In a pure product plant, sulphuric acid and soda are necessary for washing the distillates. The amount used by various operators differ and are, of course, dependent upon the amount of the various constituents which must be washed out of the product. An average figure seems to be from 0.3 to 0.5 lbs. of sulphuric acid per gallon of light oil produced, and about one-tenth as much soda. Some operators give the amount of sulphuric acid required for washing the crude toluol as 0.8 pound per gallon of the toluol treated. The present prices of acid was stated as about four cents per lb. and soda at about eight cents per lb., making the cost of these materials about 1.6 cents and 0.3 cent respectively per gallon of light oil produced.

No figures are available as to the cost of lubricating oils for the numerous pumps, packing, gaskets, etc., but from the nature of the materials handled it seems likely that these expenses are rather heavy.

The consumption of steam, cooling water, and electric power vary according to local conditions and the cost of the separate items are, of course, variable. The steam consumption for the stills and accessories alone is estimated by various operators as from 40 lbs. to 65 lbs., or even more in some cases, per gallon of light oil produced. the consumption depends largely upon the extent to which the heats of the still effluent and distillate are utilized to heat the incoming benzolized oil. One operator who recovered crude fractions only from 14 million cubic feet of lean by-product oven gas per day, stated that his steam consumption was about 65 lbs. per gallon of light oil, distributed as follows:

Stripping still	14.2	lbs.
Superheater	48.8	"
Crude still	2.0	"
	65.0	"

In this case there was no vapor-to-oil heat exchanger in use and the oil-to-oil exchanger was an improvised apparatus. The lower figure, 40 lbs. per

gallon, was quoted by the operating superintendent of a chain of several plants as the requirement of the stills and accessories. No estimate could be obtained of the steam consumption of the various pumps in these plants. In many cases there seems to be no careful record kept of these items. In one plant washing about 12.5 millions cu. ft. of mixed gas per day, and producing pure products, it was stated that 250 boiler horse power were required for the entire recovery plant. As this plant produces about 3,100 gallons of light oil per day, this would be equivalent to about 57 lbs. steam per gallon, assuming that the boiler horse power used was correctly estimated. One operator having several plants under his supervision gives eight to nine pounds of steam per pound of pure products as an average figure in a plant having two heat exchangers. The question of installing elaborate heat exchangers in a given case to save steam must be decided by local conditions. If the cost of steam production in a plant is very low, it may not be expedient to install all the equipment necessary for the fullest utilization of the waste heat. In a small plant, especially, it might not be feasible to install all this equipment and the use of steam could hardly be expected to be as low per gallon of product as in a larger plant.

The water used in a light oil recovery plant for cooling purposes is also a very important item. In order to obtain efficient scrubbing of the gas the wash oil must be cooled to 30° C. or thereabouts, and the condensers and dephlegmators must have an adequate supply of cooling water or light-oil vapors will be lost. The amount of cooling water used will depend to a great extent upon the temperature of the water supply. A plant which is so fortunate as to have a supply of very cold water will be able to use considerable less than a plant in which the water is relatively warm. A requirement of about 60 gallons of cooling water per gallon of light oil produced seems to be an average amount. One operator of several plants gives 1.2 gallons of water per gallon of wash oil circulated as an approximate figure. A plant which is favorably laid out may find it possible to utilize a portion of the cooling water for other purposes after it has passed through the coolers; much water may also be saved in some cases by recirculating. The cost of cooling water will in all cases be a controlling factor and will determine how elaborate should be the layout with a view to saving water. Water can be used for cooling in many cases which would not be fit for boiler feed unless treated. In contemplating any light oil recovery installations, especially in a small plant, one of the first considerations should be the adequacy of the existing steam and water supplies.

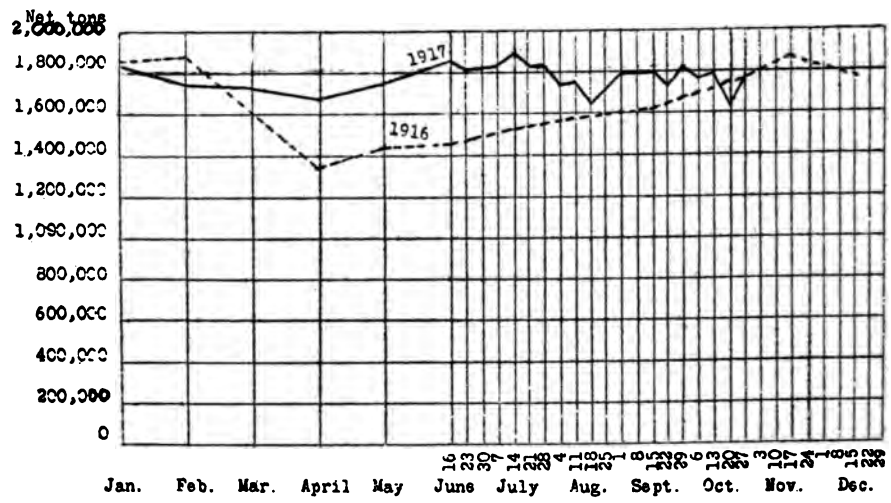
The labor expense in operating a benzol plant is a variable item for which only an approximation can be given. In starting a plant and establishing a routine, a larger force is required than after the plant is under regular operating conditions. A superintendent who has general charge of the operation of several plants states that the regular operating force for a plant producing crude fractions consists of seven men during the 24 hours of the day, assuming that each man works an eight-hour shift. Of this force one man should be a technical man who understands the testing connected with the process. The actual operators are men of average attainments, usually of the same degree of skill as water-gas makers.

In come plants where very crude fractionations are made, even a smaller force is sometimes employed, though whether a smaller force could carry on the process efficiently is questionable. In one coke oven plant washing 14 million cubic feet per day, it was stated that the actual operation of the recovery plant required ordinarily only two hours of one man's time on each 12-hour shift and about six hours of a chemist's time in 24 hours. It also was stated that the operation of the recovery plant was much less troublesome than the operation of the ammonia equipment of the same plant.

No figures were obtainable which would permit even a rough estimate of the overhead expenses, fire insurance, maintenance, and depreciation of a light oil recovery plant. Frederick H. Wagner, in his book entitled "Coal Gas Residuals," published in 1914, allows ten per cent of the original cost of the plant to cover these items. We have no information to substantiate or disprove this estimate. In view of the uncertainty of the benzol and toluol market in the future and the fact that it might not be profitable for city gas companies to recover benzol and toluol without the exceptionally high prices for these products now prevailing, especially if reenrichment of gas were necessary, it seems as though a value of ten per cent would be much too low an estimate for a company to safely calculate upon.

Coal Production for Week Ending November 3, 1917.

With the return to work of the striking miners in Illinois, says the U. S. Geological Survey, the average production per working day rose to a level approximating the performance during the corresponding weeks of 1916. The total bituminous production last week (ending November 3) was 10,665,956 net tons, an average of 1,777,660 tons per working day, as compared with 1,663,197 tons during the preceding week. A comparison of the curves for 1917 and 1916 shows that only by decided acceleration of the present rate of production will the output during the remaining weeks of 1917 exceed that for the same period last year.



Estimated Average Total Production Per Working Day of Bituminous Coal.

Expansion Contemplated by the Troy (N. Y.) Gas Co.

The Troy (N. Y.) Gas Co. has increased its capital from $3,000,000 to $5,000,000 for expansion purposes.

M. C. Greenleaf, sales manager of the Columbus (Ind.) Gas Light Co., has entered the military service, and his wife recently was appointed to take his place.

OPINIONS AND COMMENTS

BY-PRODUCT RECOVERY.

The tremendous demand for benzol and toluol created by the war—the raw materials for the high explosives picric acid and trinitrotoluol—has resulted in a shortage which must receive immediate attention. Especially is this true of toluol. With our present annual production of about 11,000,000 gallons of toluol absorbed by the U. S. navy and the Allies, it is necessary to find additional sources to supply our land forces. It has been estimated by Major Burns, of the ordnance department, that the mobile artillery alone will require 23,000,000 gallons of toluol by September, 1918.

As all of the by-product coke oven plants in this country are now recovering every gallon of toluol possible, it is quite evident that other sources of supply must be found. This situation offers an unusual opportunity for American gas companies to serve our government in this emergency by stripping the light oils from the gas. With the proper kind of team work much of this toluol shortage can be supplied by gas companies.

While the installation of recovery plants involves an investment which many companies may hesitate to make in view of the uncertain demands for these products after the war, the government has announced its readiness to insure gas companies against any loss.

Every gas company executive should read the article on toluol recovery in this issue. It is the result of an exhaustive investigation by the United States Bureau of Standards. This article has just been released and THE GAS RECORD is the first gas paper to publish this important report. Numerous other important articles bearing on this same subject have appeared in this paper during the last six months.

As long as the demand for natural products of the country is greater than the supply, we cannot have a business depression.—Secretary of Treasury McAdoo in St. Louis address.

TOLUOL AND A TORPID LIVER

The engineers and managers in the gas industry must have been amazed a short while ago, as were we, to read in the "Gas Age" an article attacking the integrity of the American Gas Institute committee on public relations, members of which had just then appeared at a conference promoted by the United States Bureau of Standards in the interest of the toluol supply for the government's war munitions. Since that article appeared (Sept. 1st), supported by an editorial in the "Gas Age" which approved the attack on the A. G. I. committee and denounced the effort to enlist government financial aid in equipping gas plants with the apparatus necessary to recover toluol, the amazement among loyal gas men has grown to indignation, culminating in the publication of some highly illuminating correspondence in the November issue of the "Gas Institute News." Mr. J. B. Klump, secretary of the A. G. I. committee on public relations, asks in this correspondence if anyone connected with the Bureau of Standards supplied the sinister article to the "Gas Age," and Director S. W. Stratton, of the Bureau, states emphatically that no one in the Bureau had anything to do with it or knew that it was to be published. The attack on the committee, then, and the attempt to nullify the A. G. I. plan to furnish the government with more toluol, seems to be pretty well up to the "Gas Age." Its editorial of Sept. 1st under the title "Autocracy," sustaining the attack in its news columns on the committee, said this:

> "In two conferences the intention to make the government pay for the recovery plant necessary to remove benzol and toluol from the gas was evident and there is some probability that much larger issues may be sacrificed to bring this about. * * * * * We do not know whose pet idea this is, but it is our opinion that it is poor policy and still worse practice. It is reported that the impression prevailed that the gas company representatives were not frank at the conference. To be frank, candid, honest, evidently good intentioned, outspoken, these are the things the public demand. * * * * * To invite suspicion or distrust through a mistaken opinion as to the attitude of the public or an evident intention to "put something across" stirs up antagonism and prevents co-operation. * * * * *
>
> It is a question as to how much longer the business will be willing to put up with this sort of domination. When the time comes to supplant arrogant autocracy by liberal democracy in the affairs of the world, let us hope that the gas business will set the example."

It would be highly interesting to the entire gas industry at this critical period to know just what were the motives behind this attack on the American Gas Institute and the simultaneous attempt to asphyxiate the only feasible plan by which the government's insistent cry for toluol can be met—the plan, by the way, which has now been approved by both the government representatives and the gas companies that will supply the toluol.

Is it really a sinister motive that prompts this uncalled for activity on the part of a gas journal that claims in recent advertising to "dominate" the industry; or is it just another bungle that must be set down to loose thinking and a bad liver?

The gas fraternity would like to know.

The GAS RECORD

Vol. 12 No. 9 — CHICAGO — Nov. 14 1917

Entered as second-class matter at the post office at Chicago, Illinois, under the act of March 3, 1879.

W. H. Graffis . . . . . *President*
H. D. Fargo . . . . . *Vice-President*
H. B. McMeal . . . . . *Secretary*
Herbert Graffis . *Treas. and Adv. Manager*
Milt Saul . . . . *Vice-Pres. and Editor*
Walter V. Turner . . . *Technical Editor*

SUBSCRIPTIONS

The subscription price of THE GAS RECORD is $2 a year in the United States, Cuba and Mexico; in Canada it is $3; in all other countries, $4; single copies, U. S. A., 25 cents.

ADVERTISING

THE GAS RECORD is issued the 2nd and 4th Wednesdays of each month. Copy can be accepted as late as the Monday previous to each issue. Where proof must be seen, allow ample time for transmission in the mails.

Display Advertising—Rates on application. Classified Advertising — "Wants," "For Sales," etc.—5 cents a word per insertion, minimum charge $1.

NATURAL GAS DEVELOPMENTS

BUYS BUFFALO CO.

Same Interests Operating Iroquois Natural Gas Co. Will Now Operate It.

William J. Judge, vice-president of the National Fuel Gas Co., has acquired the property of the Buffalo Gas Co., and the company will be operated by the same interests that control the Iroquois Natural Gas Co.

By the sale of the company, the bondholders will get at least 40 cents on the dollar. The sale brought $2,360,000, but Mr. Judge agreed to pay that sum in addition to an amount that would enable the bondholders to realize 40 per cent. The stockholders, it is believed, will receive nothing.

The property of the company, which has been in the hands of receivers for several years, was bid in last July by Louis H. Gethofer, banker of Pittsburgh, at a public sale in a foreclosure proceeding brought by the New York Trust Co., trustee for the bondholders.

Although the Buffalo Gas Co., and the Iroquois company will be controlled by the same interests, there will be no merger at present. The prospect is that the consumers will benefit through the transaction and the expected reorganization of the Buffalo Gas Co., for there probably will be an extension of mains to districts not now supplied with gas.

Mr. Judge, who filed the deed conveying the property to him in the county clerk's office recently, is the vice-president of the National Fuel Gas Co., of which the Iroquois company is said to be a subsidiary. The United Natural Gas Co., of Pennsylvania, which supplied the Iroquois company with gas, is also said to be a subsidiary of the National company.

W. Va. Exports 71 Per Cent. of Its Natural Gas.

Of 291,252,435,000 cubic feet of gas produced in West Virginia during the year ended June 30, 1917, 210,321,226,000 cubic feet, or 71.4 per cent., was exported from the state, leaving 28.6 per cent. for West Virginia consumers, A. R. Shepherd, chief inspector of the public service commission, announces. The average number of wells in use per month during the year was 6,682.

Dallas, Tex. Soon To Get Oklahoma Gas.

Dallas, Tex., will soon be connected with the gas field according to the Dallas management. The line from Gainesville to Red river has been completed and work is being rushed on the Oklahoma end with a view of completing the task in November.

50,000,000 Well Brought in by Fortuna Co.

A gasser, with an estimated production of 50,000,000 cubic feet daily, was brought in by the Fortuna Co., on their tract near Cyril, Okla.

NATURAL GAS.

Increase in Production for 1916 Shown in Geological Survey Report.

Statistics just compiled under the supervision of J. D. Northrup, of the United States Geological Survey, department of the interior, show that the volume of natural gas commercially utilized in the United States in 1916 was greater than that so utilized in any other year in the history of the natural gas industry. The volume used, which amounted to 753,170,253,000 cubic feet, constitutes a new record, exceeding by nearly 125 billion cubic feet, or 20 per cent., the former record, established in 1915.

The average price of this gas at the point of consumption was 15.96 cents a thousand cubic feet and its total market value was $120,227,468, a loss of 0.16 cent in unit price, but a gain of $18,915,087, or 18.6 per cent., in total value compared with 1915.

Credit for increased production of natural gas in 1916 belongs, in the order given, to West Virginia, Oklahoma, Pennsylvania, California, Louisiana, Kansas, Texas, and Arkansas, which together produced 132 billion cubic feet more gas in 1916 than in 1915. Significant increases, important locally, but unimportant as affecting the production of the entire country, are credited to Illinois, New York, and Montana. In only two states was there a significant decrease in the production of natural gas in 1916. The rapid exhaustion of the prolific Cleveland field, in Cuyahoga county, Ohio, resulted in a loss of some 9.6 billion cubic feet in the total volume produced in Ohio, and the steady decline of the old fields in Indiana caused a falling off of 0.6 billion cubic feet in the output of this state.

The general increase in the production of natural gas in the United States in 1916 is attributed principally to an enormous expansion of the casing head gasoline industry in all natural gas producing states and to a greatly augmented demand for natural gas as fuel by industries engaged in the manufacture of munitions of war. The influence of this demand is shown in the increase in the volume of gas distributed to industrial consumers and in the increase in the value of gas consumed, its effect being sufficient to lower the average price per thousand cubic feet of all gas sold in 1916 1 per cent. as compared with 1915.

The principal beneficiaries of the increased production of natural gas were, in the order named, Oklahoma, Pennsylvania, Ohio, Kansas, West Virginia, California, and Louisiana, which together consumed some 104 billion cubic feet more gas in 1916 than in 1915.

Of the total volume of natural gas produced and consumed in 1916, it is estimated that 235,380,764,000 cubic feet, or 31 per cent., was distributed to 2,362,494 domestic consumers at an average price of 28.63 cents a thousand cubic feet, and that the remaining 69 per cent., or 517,789,489,000 cubic feet, was distributed to 18,278 industrial consumers at an average price of 10.21 cents a thousand. Compared with 1915 these data show gain of 8 per cent. in volume, of 8 per cent. in number of consumers, and of 1 per cent. in average unit price of gas supplied for domestic use, and a gain of 26 per cent. in volume and of 5.5 per cent. in average unit price, but a decrease of 0.4 per cent. in the number of consumers of gas supplied for industrial use.

The proportion of natural gas supplied to industrial consumers in 1916 was 4 per cent. larger than in 1915.

Natural gas produced and consumed in United States in 1916.

State.	Produced.			Consumed.		
	Quantity (M cubic feet).	Price (cents per M cubic feet).	Value.	Quantity (M cubic feet).	Price (cents per M cubic feet).	Value.
West Virginia	299,318,907	15.90	$47,603,396	[a] 105,104,008	8.19	$8,610,084
Pennsylvania	129,925,150	18.74	24,344,324	201,460,893	17.38	35,015,605
Oklahoma	123,517,358	9.70	11,983,774	[b] 93,704,221	7.54	7,062,142
Ohio	69,888,070	22.32	15,601,144	169,480,011	22.06	37,394,410
Louisiana	32,080,975	8.29	2,660,445	[c] 32,080,975	8.29	2,660,445
Kansas	31,710,438	15.31	4,855,389	[d] 60,564,112	16.07	9,731,518
California	31,643,266	17.19	5,440,277	31,643,266	17.19	5,440,277
Texas	15,809,579	19.89	3,143,871	15,809,579	19.89	3,143,871
New York	8,594,187	29.37	2,524,115	20,594,123	30.26	6,230,826
Illinois	3,535,701	11.22	396,357	[e] 3,535,701	11.22	396,357
Arkansas	2,387,935	10.13	241,896	3,347,398	8.59	287,599
Kentucky	2,106,542	35.73	752,635	9,887,956	23.55	2,331,687
Indiana	1,715,499	29.34	503,373	5,021,364	34.78	1,746,285
Wyoming	575,044	14.97	86,077	575,044	14.97	86,077
Colorado						
Montana	213,315	18.21	38,855	213,315	18.21	38,855
South Dakota						
Alabama	77,478	40.75	31,573	77,478	40.75	31,573
North Dakota						
Missouri	69,236	25.41	17,594	69,236	25.41	17,594
Tennessee	2,000	57.50	1,150	2,000	57.50	1,150
Michigan	1,298	73.04	948	1,298	73.04	948
Iowa	275	100.00	275	275	100.00	275
Total	753,170,253	15.96	120,227,468	753,170,253	15.96	120,227,468

[a] Includes gas piped from West Virginia and consumed in Maryland.
[b] Includes gas piped from Oklahoma and consumed in Missouri.
[c] Includes gas piped from Louisiana and consumed in Arkansas and Texas.
[d] Includes gas piped from Kansas and consumed in Missouri.
[e] Includes gas piped from Illinois and consumed in Indiana.

SELLING GAS

Jacksonville, Fla., Stages Big Appliance Sale.

An energetic Humphrey heater week recently was put on by A. H. Rumbold, sales manager of the Jacksonville, (Fla.) Gas Co. As a result of this activity in one week sales were made of the following appliances: 32 Humphrey Automatic water heaters; 12 circulating tank water heaters; 4 Humphrey instantaneous bath heaters; 17 cabinet gas ranges; 3 double oven gas ranges; 7 single oven gas ranges; 4 gas steam radiators; 2 portable air heaters; 1 hot plate; 4 miscellaneous appliances.

Half Page "Humphrey" Display.

To use Mr. Rumbold's own words, the sale resulted in dollars and cents as follows:

"In all, the sales totaled a little over $4,000. In addition to the sales closed we have prospects left over which are very good. We have closed about $1,000 worth of them so far. I feel that the money we spent on advertising this week has brought the company very good results."

A very attractive window was arranged by Mr. Rumbold, as shown in the accompanying cut. The scene was painted to represent Niagara Falls, advertising the slogan "Oceans of Hot Water." Six or eight pages of advertising were carried in the newspapers.

Advantages of Gas for House Heating Purposes.

The Baltimore (Md.) Consolidated Gas Co., which has successfully specialized in house heating by gas for the past two or three years sums up the method's advantages as follows:

1. Uniformity of temperature in the house.
2. Dust and dirt reduced to a minimum.
3. Fuel not stored in cellar in advance of season, customer paying for gas as he uses it.
4. Elimination of storage space required for coal.
5. Cleaner cellar, and hence, more extended use for it.
6. Ease of mind on part of tenant concerning firing troubles and lax janitor service.
7. In restricted and exclusive suburbs, the abatement of the smoke nuisance and carting of coal, with the attendant dirt, across well kept paths and lawns.
8. Highly efficient fuel service.

Gas Displaces Coal for Preparing Soldiers' Meals.

R. E. Dallas, of the Kings County Lighting Co., Brooklyn, N. Y., recently equipped an all-gas kitchen for the United States Naval Reserve Force Section Base No. 6, located in that city. Replacing a 10-ft. coal range the new equipment consists of seven sections of hotel gas range on the west side, and six sections on the north side of the kitchen. On the west is a No. 8 automatic water heater and on the east side two 50-gallon coffee urns. The complete installation cost the government $2,646.94 and gas consumption is estimated at $10 per day to supply 1,200 men with food three times a day. The change has been highly satisfactory to all—except the coal range manufacturers.

Army Hospital at Tacoma Uses 500,000 Cu. Ft. of Gas Monthly.

The hospital unit at Camp Lewis (American Lake, Washington, cantonment near Tacoma, Wash.,) which will be supplied gas for cooking, laboratory work and in sterilizing rooms by the Tacoma Gas Co., will use approximately 500,000 cu. ft. per month.

Full Page Water Heater Ad.

J. B. Murdaugh, manager at Colorado Springs, has resigned to go into business for himself.

Allan Rumbold's Niagara Window.

CURRENT ADVERTISING REVIEW

The idea for the window display on this page submitted by Robert Weidow of the Mohawk Gas Co., Schenectady, N. Y., won third prize of $10 in the McJunkin window trim contest, after final markings of the judges had been made. That the window offers companies a simple and inexpensive method of increasing interest in gas room heaters of all kinds was the opinion of the

Thanksgiving Dinner Then—and—Now

PURITAN DAYS meant primitive cooking—delightfully romantic perhaps to look back upon, yet tremendously inefficient according to modern standards. Today we would hardly know how to manage our households with such limited conveniences.

Today, in a modern kitchen, with a Cabinet Gas Range, cooking a Thanksgiving Dinner not only entails little work, but is a real pleasure.

No other fuel lends itself so well to the clean, sanitary preparation of food. No other fuel is so dependable—so adjustable in heat regulation—so economical.

Be sure your Thanksgiving meal is cooked with Gas this year.

(Your Name and Address)

A Timely McJunkin Ad.

judges. Mr. Weidow made a large cardboard cutout of the state of Florida, marking all the principal cities, but placing special emphasis on the location of Palm Beach. This he suspended from the ceiling so that it hung about four feet from the window glass. The floor of the window was covered with white sea sand in which pieces of coral, sea shells and other appropriate things were strewn. The background of the window consisted of orange-colored crepe paper, arranged to depict the rising sun. From the sun, rays of orange crepe paper were stretched to the window ceiling. A reflector heater was placed directly in front of the sun and was lighted, giving the impression of the blazing sun. Other gas room heating appliances, large and small, were arranged in semi-circular form in the window. Strips of ribbon were tied to each, leading in turn to cities on the cutout of Florida.

SELLS 592 HEATERS.

Lancaster, Pa., Shows How Eager Is the Public To Heat With Gas.

The portable heater campaign conducted by the Lancaster (Pa.) Gas Light & Fuel Co., the first two weeks in October, must have established a record for results. A total of 592 heaters, of the "Sunbeam" reflector type, made by the Geo. M. Clark & Co., Chicago, were sold and installed during the twelve working days of the sale. This achievement is all the more remarkable, and worthy of serious consideration by other gas companies, by reason of the comparatively small effort expended to attain it.

Commercial Manager H. J. Von Neida, when asked for the details of his campaign, simply exhibited a small hand-bill, or flier, containing the announcement that a special cash price would prevail during the two weeks of the sale.

"All we did in the way of publicity," he said, "was to place one of these fliers in the hands of each customer. The first day of the sale we disposed of 29 heaters. The sixth day the sales amounted to 129, and the twelfth, or last day, we sold 69."

The results of this campaign show conclusively that the public will adopt

GAS HEATER SALE

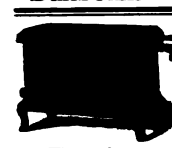
EXTRA! SPECIAL!

Two Weeks—October 1st to 13th

We will sell to our customers (only one to a purchaser) a

No. 819

"Sunbeam" Reflector Gas Heater



With six-foot length of High-Grade Tubing at the

SPECIAL CASH PRICE $2.98

The regular price of the heater alone, not including tubing, is $5.50.

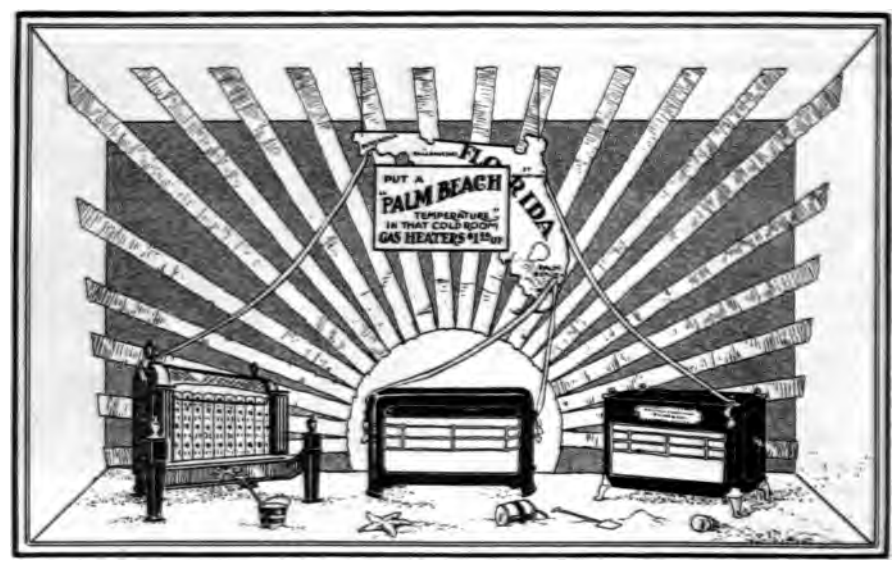
Avoid disappointment and place your order at once—our supply of heaters is limited.

Why worry about the price of coal, why shiver and freeze when you can be cozy and comfortable with gas heat? Again we remind you—Act quickly, order your heater now.

LANCASTER GAS LIGHT & FUEL CO.
SALES DEPARTMENT
19 EAST ORANGE STREET, LANCASTER, PA.

The Lancaster "Flier."

the room heater into their homes these days of high price and exceedingly scarce coal if the gas company will merely let it be known that they have the heaters for sale.



Prize Winning Window Trim by Weidow.

Water Heaters

An Interesting Paper Read Before the Recent Texas Gas Meeting

By F. G. Kune

No doubt very soon after man discovered how to kindle a fire by rubbing two dry twigs together, he felt the necessity of hot water, or at least found out how he could obtain it. Not that he wanted his hot coffee in the morning, but hot water to prepare his food and medicines. The Egyptians, thousands of years before Christ, had their hot baths. The Romans had immense public baths as well as private baths in the homes of the royalty and the rich. So hot water is nothing modern, but merely has been brought within the reach of the public in large volume, by quick and convenient methods at a cost they can afford.

When Columbus landed in America he found the aborigines, when in need of hot water, secured it in a very crude way. A shallow hole was dug in the ground and lined with an animal skin. This was filled with water and heated stones were placed in it to radiate heat to the water. This primitive method continued until the arrival of oversea adventurers from Italy, Spain, England and the Norseland, bringing with them iron pots, which they suspended over a fire on crude hangers or tripods. The Indians were quick to note the advantages of this method of securing hot water and some of these same iron utensils were exchanged for land which today is the most valuable in the world. These adventurers who landed on our southern shores did not erect shelters such as those who landed further north were compelled to build to protect themselves from the rigorous winters. In New England stout log houses were builded with enormous fire places in which an iron pot hung from a crane. The crane, with its accompanying kettle or pot, was the common method of securing hot water until very nearly the opening of the Revolutionary War.

Kitchens Have a History.

By this time the villages had increased in size; houses were being built with some attention to architectural design and comfort, and in place of one general living room and kitchen, a separate room was assigned for cooking purposes. These kitchens first had their inception in the South, where detached kitchens were erected to keep the heat from the house. These colonial kitchens were equipped with huge brick fireplaces containing Dutch ovens on each side, an iron spit across the hearthstone and the familiar pot and crane.

Previous to the outbreak of the Revolutionary War, the Franklin grate appeared. This was merely a cast iron portable stove, built very much like a grate, but with sliding doors in front, and was the first radical departure from the brick fireplace. It was but a short step from this cast iron grate to the coal or wood range of cast iron, which rapidly supplanted the brick fireplaces owing to the economy of fuel, first cost and heat-radiating qualities.

After the War of 1812, when the cities were beginning to become crowded, real estate increasing in value and home comforts were receiving more attention, a separate room was assigned in the homes of the better class exclusively for toilet purposes; this was called the bathroom. As there were no municipal waterworks, the water for domestic use was secured from wells and pumped by hand to reservoirs or tanks in the attic or upper story of the home, flowing by gravity to the bathroom and kitchen.

With the advent of the cast iron stove, the iron pot was supplanted by the copper kettle, which was, however, hardly satisfactory if any great quantity of hot water was desired.

An enterprising stove manufacturer conceived the idea of incorporating in a range a reservoir for holding water which could be warmed from the radiated heat of the stove. This was placed at the back of the stove, and in securing hot water from one of these reservoirs, care had to be exercised in order not to insert the dipper too far and stir up the accumulated mud at the bottom. It was a regular weekly task of many of our grandparents to clean and scour these reservoirs on Saturdays.

The First Circulation.

Shortly after the advent of the reservoir, it was discovered that if a copper boiler were placed over the cook stove and piping be extended from this boiler in to the fire pot of the stove and connected to the boiler, that the heated water would circulate through this "water back" and eventually heat the entire contents of the boiler. If a gravity system supplied this reservoir the water could be piped from the boiler to the bathroom located elsewhere in the house; thus the circulating system of heating water became a fact. These circulating water backs were not entirely satisfactory. It was a case of "first come, first served." When the boiler was exhausted a considerable wait ensued before an additional supply was available, and as it was necessary to have hot water in the summer that meant a coal fire and a warm house in consequence.

Toward the close of the administration of the fourth president of the United States, a gas plant was erected in the city of Baltimore. Boston and New York City followed shortly thereafter with similar installations. These gas plants were originally intended for the supplying of gas for illuminating purposes only.

It is a standing maxim of all gas men that matches are cheaper than gas, but shortly after the Civil War, a box of matches containing only fifty cost a nickel, on account of the placing of a two-cent revenue stamp on the box, and people having gas in their homes left a tiny flame burning on their light jet and used this to light a torch wound from newspaper. The success they met with in employing gas as an illuminant led to experiments tending for the use of gas as fuel. The process of manufacturing gas was cheapened until gas for fuel became practicable. With gas for fuel the need of a gas range appeared. The first gas range manufacturers were stove manufacturers who made the gas range as a side line and, naturally, being iron founders first and stove makers afterwards, the first gas ranges were built of cast iron.

Advent of the Range.

The gas range began gradually, but surely, to supplant the coal range in the kitchens of many homes. Some manufacturers endeavored to install a water back in the gas range to heat the kitchen boiler, but the lack of sufficient rise for the circulators and the distance that the heated water had to travel to find storage in the boiler, tended to discourage this type of water heater construction. The idea finally developed of building a separate cast iron heater for the boiler. These were called "Circulating Water Heaters." Simultaneously with the appearance of the circulating cast iron heater came the instantaneous or bathroom water heater.

The circulating water back, and the early cast iron heaters with crude low-power gas burners had proved anything but satisfactory in supplying, economically, "prompt service" hot water to the bathroom. As late as twenty years ago, there were no appliances for the heating of water in districts using manufactured gas, with the exception of the crude cast iron circulating water heater and the somewhat uncertain "instantaneous" bath heaters of those days. You are all too well acquainted with the instantaneous heaters for me to take up any time on that type of heater.

In Natural Gas Fields.

In the early eighties, natural gas came into general use in western Pennsylvania. This completely revolutionized the gas fuel water heater industry. Natural gas afforded fuel which had a high pressure and an intense heat. This gas was offered in Pennsylvania on an annual rental basis of from $5 to $12 per year for all the gas one could use. The gas was so plentiful that huge flambeau were installed in the streets of many towns in the natural gas belt and left burning during the day, it being considered a waste of money to extinguish the lights.

With this exceedingly inexpensive fuel any convenient means of heating water was resorted to. Cast iron burners were inserted under range boilers and were permitted to burn at will. However, it was found that unless the water was drawn off frequently these "horseshoe" burners would overheat the boiler and steam would be formed, with consequent damage to the house piping. To eliminate this defect, "blow off" pipes were installed, but these were hardly satisfactory, owing to the fact that when the valve did "pop" it would usually exhaust all of the hot water in the boiler before it would reseat, and unless the overflow was properly piped the kitchen would invariably be flooded.

It was soon found necessary to adopt some method of extinguishing the gas when the water reached a temperature approaching the formation of steam. From well-known principles of the expansion and contraction of metals, was evolved a temperature regulator, or thermostat, which was to aid in eliminating the danger resulting from over-heating of water in these storage tanks. Some of the early thermostats were nothing more than a copper rod or tube, the expansion and contraction of which, bearing on two levers, closed and opened a single gas valve seat.

A crude thermostat used in conjunction with a storage boiler was the first automatically-controlled device for the heating of water—really the basis of the first automatic heater. Continuous experiments have resulted in the automatic gas water heater of the "flow" or "direct" type. The first heaters of this type contained nothing but a long spiral coil of copper tubing placed over a series of burners, with a gas valve operating in conjunction with a single water valve, which was so constructed that a plunger in this valve would be forced over by a difference in water pressure and thus unseat the gas valve and permit the ignition of the burners from a small light which burned continually.

Copper Coil Construction.

While the manufacturers were experimenting with thermostats and endeavoring to perfect their machines, the remarkable results in service efficiency obtained from copper coils and the resistance that copper construction offered to incrusting minerals, as demonstrated by the use of same in automatic heaters, caused a manufacturer to construct a circulating water heater with copper coils in place of the cast iron discs that had been previously used in circulating heaters. The experiment was so satisfactory that copper coils construction has now been adopted by the majority of gas companies and manufacturers, as standard.

Thus we find that the crude cast iron tank heater of early days with its low-power burner and rust-provoking circulators has given way to the compact, neat appearing, high-power double coil tank heater of today, with an easily opened door. The undependable "instantaneous" heaters of a few years ago have been replaced by automatic water heaters capable of supplying the whole house, and as economically as the old type bathroom heater. The majority of people today are either interested in a low, first-cost circulating tank heater of improved design, or an automatic water heater capable of supplying hot water at all the faucets instantly.

The remarkable development from the hole in the ground with hot stones in it to a polished brass faucet and an automatic heater required years of patient effort and a great expenditure of money, but the results are the perfected appliances so well known today.

Water Heater Campaign in Peoria Great Success.

October 1917 was the coldest October encountered in Peoria, Ill., in 62 years. Notwithstanding this fact the Central Illinois Light Co., put on a water heater campaign making the fourth of the year with a total of over 250 automatic water heaters sold this year to date. Forty-five heaters were sold in the campaign just closed and in a good proportion of these sales furnace coils were displaced, which proves for itself automatic water heaters can be sold in the winter as well as summer.

The Central Illinois Light Co., is controlled by the Hodenpyl, Hardy Co., of New York and they are justly proud of their sales manager, T. D. Buckwell, as he has always been a new business getter and the success of the fall campaign is just another laurel to be added to an already big collection.

One of the features of the campaign was the novel window display reproduced here, a creation of W. L. Price, stellar salesman of Mr. Buckwell's well trained force. A No. 4 Ruud automatic water heater mounted on a pair of wagon wheels formed the effect of a huge "Howitzer" by placing a piece of stove pipe on the flue vent. Autumn leaves were scattered over the cannon and wheels so as to form a camouflage effect, and a miniature aeroplane hovered above the cannon. Concealed electric fans played on the American flags and the aeroplane keeping them in motion all the time. The wording "Help Uncle Sam Meet the Coal Shortage," "Heat Your Water With Gas," was carried out in the newspaper advertising during the week.

Show Window Is Attracting Big Attention.

The show window of the Grand Haven (Mich.) Gas Co., is attracting no small amount of attention, with its display of home lighting and heating fixtures. The window is constructed to represent a room in a residence, with an arrangement showing how the rooms of a house can be made attractive by the features on sale by the company. The display features the Radio X lights and the Humphrey Radiantfire. The window arrangement is so cleverly done that the features do not jar on the artistic sensibilities of the observers. The window was decorated by H. Hollebeek of the company, who has won prizes before by his careful window decorations.

Lighting Window at Grand Haven, Mich.

Peoria, Ill., "Camouflage" Cannon.

Manager Collins Wins Favor of Mississippi Folk.

The acquisition of E. H. Collins, as manager, by the Greenville (Miss.) Gas Co., has resulted in a surprising increase in the sales of gas and gas appliance in that southern community. Mr. Collins evidently has been applying his experience to both the sales end of the business and the public policies of the company, for the sentiment of the people of Greenville has a decided leaning toward friendship for the gas company. A recent water heater sales campaign inaugurated by Manager Collins, assisted by the Humphrey Co., is a good example of the successful administration of the business end. The display window was fitted up with a No. 30 automatic Humphrey connected to a faucet outside the window so that passers-by might turn the faucet and see the heater light up. The floor display inside consisted of one No. 30, one No. 60 and one No. 40 heater, with a No. 5-1 tank heater as a side show. The window trim and the floor display are both shown in the accompanying picture, the men on the sales floor being Manager Collins and W. C. Tupper, of the Humphrey Co., of Kalamazoo.

Garage Heater Shown In Philadelphia Window.

In Philadelphia during early October, the U. G. I. featured the new garage heater in a very attractive window exhibition. In arranging for this display the first requirement was to borrow an automobile, the second, to get the car in the window. Both were possible, as the picture proves. It was necessary to take the car apart and reassemble it in the window. The background is arranged to cover in the back of the display. The heater is placed at the proper place, and a thermometer is arranged in a very conspicuous corner, which registers 42 degrees no matter how cold outside. On the other side of the display, hidden in the picture by the car, is an up-to-date work-bench with tools. This bench was loaned by a hardware company. Courtesy cards were placed on both bench and automobile. Signs covering features of the heater are shown in the foreground.

A Garage Heater Display in Philadelphia.

GAS ALL SOLD.

Indianapolis Folks Can't Heat Homes With Gas To Save Coal Bills.

Indianapolis, Ind., faces a peculiar situation in connection with the gas supply furnished by the Citizens Gas Co. With a rate of 55 cents per 1,000 cu. ft., made possible by its supply of coke-oven gas, the company has reached its maximum capacity in supplying the citizens of Indianapolis with gas for cooking, lighting and ordinary manufacturing purposes. A shortage of coal and high coal prices prevail in the city and the low gas rate has tempted many householders to turn to gas as their house heating element this season. This phase of the situation aroused the gas company officials to the danger of a gas famine, and they arranged a conference with the mayor and the Indiana public service commission. As a result of this conference, drastic steps were taken to prevent the citizens from using gas for house heating, threats of cutting off gas and also the use of police powers being the weapons held over the head of the individual who should be guilty of using gas for heating purposes.

The following statement was issued early in October by the public service commission as coming from the city, the gas company and the commission:

"To the People of Indianapolis:

"The gas supply of this city will be inadequate to meet the demands unless consumers refrain from using it to meet a shortage in the coal supply.

"The gas plant was not built to meet all of the demands for heating in the city. This service can not be substituted for coal or other fuel. The gas company has capacity for supplying 10,000,000 cubic feet a day under con-

Exterior and Interior Views of Greenville (Miss.) Gas Co. Office During a Campaign.

tinuous operation. It can produce about 11,500,000 cubic feet a day under perfect operating conditions, but it would be impossible to maintain such a production.

"The use of gas for house heating by persons who heretofore have depended on furnaces and other coal-burning appliances has recently created a demand for gas exceeding 1,000,000 cubic feet an hour. This is clearly beyond the capacity of the plant. Such a substitution of gas for coal and other fuels has already caused a shortage of supply on several days. The gas company is face to face with a demand of 15,000,000 or 16,000,000 cubic feet a day. It can not meet it with its present equipment. It has been and is now impossible for the company to increase its gas production capacity. The demand of the Federal government for steel plates, such as used for constructing gas holders, has made it impossible to get such material. It is equally impossible to get material at this time for enlarging the gas generating equipment.

"On more than one occasion this fall the gas supply of the entire city has been seriously endangered by abuses in the use of gas. If, by reason of this unusual demand for gas, the mains were once emptied, it would require from thirty to sixty days to resume the service of gas.

"It becomes imperative that definite steps be taken immediately to conserve the gas supply. The company can supply sufficient gas for all those purposes for which gas has been used in the years 1915 and 1916. This means that there will be no curtailment of gas to those who use the same amount they used last year for cooking, water heating, heating rooms temporarily or occasionally by grates, or for ordinary manufacturing purposes. Abuses in the use of gas must, however, be prohibited.

"The company can not supply gas to meet a shortage in coal. All consumers are warned against using gas for such purposes. The principal abuses are found where patrons use the cook stove or gas range for heating purposes or use grates or heaters for continuous heating.

"The city faces a grave situation in this matter. In conserving the supply for all the people of the city, public welfare will require that consumers who persist in substituting gas heating for customary modes of heating, be cut off.

"All persons, therefore, must limit the quantity of gas taken at any time during the present season, to the purposes and amounts consumed by them during the corresponding months of the year, 1916."

Coal Shortage Boosts Gas Consumption at Sandusky, O.

The inability of coal dealers to furnish adequate supply of coal for domestic consumption is causing a decided boom in the gas department of the Sandusky (O.) Gas & Electric Co. New consumers are being taken on rapidly and burners are being installed in furnaces.

Weedon's Incinerator Device.

WHAT'S IN THE CAN?

Weedon's Device for Advertising Incinerators Shows Vividly What's There.

John Weedon's device for advertising the gas fired incinerator made the big hit at the recent Chicago Household Exposition, and now Mr. Weedon seriously contemplates manufacturing the trick and offering it to gas companies generally. It certainly caught the eye of the Chicago householders when it was on exhibition, and it planted the message of the incinerator deep in the minds of those who paused before it, even though it were but an instant they gazed.

The device consists of an ordinary looking garbage can. Instead of the usual accompaniment of filth and insects, however, Mr. Weedon has perfected a piece of mechanism that intermittently opens and shuts the can, at the same time bringing up slowly but inevitably the emblem of disease, a death's head. It is such a clever trick that all the horrific atmosphere usually attending this illustration is dispelled and only the vivid impression is made that disease lurks in that can.

Mr. Weedon is a member of the publicity bureau of the Peoples Gas Light & Coke Co., Chicago.

At the Chicago show the device was used with the Ricketts incinerator and drew crowds mornings, afternoons and evenings. John Aymar, of the Nightingale Co., and J. P. Walsh, of the Peoples Gas Light & Coke Co., are shown in the accompanying illustration.

Incinerator Exhibit at Chicago Household Show.

PROBLEMS IN THE GAS BUSINESS

Conducted by W. M. Henderson, Assistant Engineer Gas Department, Pacific Gas & Electric Co., San Francisco.

ANSWERS TO QUESTIONS.

233—Thermite.

What is the reaction that takes place when thermite is used for welding, the welding temperature obtained, and is it suitable for use on all metals?

Thermite is finely divided aluminum mixed with metallic oxide in about equal proportions by volume. When the reaction between the two is started, it proceeds of itself and develops great heat, producing molten aluminum oxide as slag, and the molten metal whose oxide was reduced. The ignition powder is made up of a mixture of barium peroxide and finely divided magnesium, and reacts according to the following equation:

$$BaO_2+Mg=BaO+MgO.$$

In the thermite itself, if the sesqui-oxide of iron is used, the reaction is as follows:

$$Fe_2O_3+2Al=Al_2O_3+2Fe.$$

The mixture of iron sesqui-oxide with aluminum is known as "red thermite" and the magnetic oxide mixture as "black thermite," the latter being, probably, the most used. The reaction with the magnetic oxide occurs thus:

$$8Al+3Fe_3O_4=9Fe+4Al_2O_3.$$

In this reaction, the weights used are approximately three of aluminum and ten of magnetic oxide, which produce about seven of metallic iron and six of slag. But in actual practice the proportions are usually one of aluminum and three of magnetic oxide. It is generally estimated that the molten metal produced is about one-half the original mixture by weight and one-quarter by volume.

The temperature produced by the heat of the thermite reaction is very great. It has been calculated by Richards as 2,694 deg. C. Fery, using the radiation pyrometer found the temperature of the stream of metal flowing from the crucible to be 2,300 deg. C.

The exceeding hot metal has proven to be very useful in a certain form of welding. For the purpose of welding, the parts to be joined are cleaned, butted together, and the joints surrounded by a suitable mould, and the ends are then heated by a gas flame playing through an opening provided in the mould for this purpose. The hot metal is allowed to flow from the reaction crucible into the mould, where the ends being joined are fused by the heat, and upon cooling, the mass solidifies as a whole. The process is applicable to wrought iron, steel, cast iron, and other metals whose oxides are capable of reduction by aluminum, as for example, nickel, manganese and chromium.

Many metallic sulphides also react with aluminum powder producing aluminum sulphide and free metal. Hence the thermite process is much used in obtaining metals from sulphide, as well as oxide ores.

This department will supply information on problems arising in every department of the gas industry. Your co-operation is solicited, both in asking and answering questions. Address: W. M. Henderson, Pacific Gas & Electric Co., 445 Sutter St., San Francisco, Calif.

NEW QUESTIONS.

246—Reinforced Concrete.

Will not iron imbedded in concrete corrode?

247—Metal Cleaning.

Have you any suggestions for cleaning grease from metal surfaces?

248—Cements.

Some place, sometime, I have seen a list of various cements for different purposes. Can you refer me to where I can get a copy of same?

235—Aluminum Solder.

What kind of solder can I make to use in joining aluminum sheets?

A satisfactory solder for aluminum is described and used as follows: An alloy containing, tin 29 parts, zinc 11 parts, aluminum one part and phosphor tin one part. Brannt states that this alloy has a fusing point sufficiently low that it can be melted with a copper soldering tool. It is tough and has nearly the same color as aluminum. It darkens somewhat upon exposure but is readily brightened by polishing. In using this solder, the edges to be joined are filed or scraped clean, and if the article will allow it, it is heated with a torch or similar device to a temperature at which the solder will melt and then the edges are rubbed briskly with a stick of solder. If the object cannot be heated in the manner stated, then the edges are heated with a tinned copper tool and the solder is rubbed on as before described. No flux of any kind is used.

Another solder that has been found to produce very satisfactory results is made up as follows: Tin, 32 parts; lead, 12 parts; zinc, 12 parts, and aluminum, one part. This is applied in similar manner to the ore previously described. Success with either solder depends a great deal upon the vigor with which the edges are rubbed with the solder stick.

236—Slaking Lime.

What takes place when slaking lime and what care must be taken in order to get a good quality of slaked lime?

The slaking of lime is a process of hydration, the calcium oxide entering into chemical combination with water to form calcium hydroxide as:

$$CaO+H_2O=Ca(OH)_2.$$

This reaction is accompanied by the evolution of a great amount of heat, so that some of the water added may be converted into steam, this being especially noticeable in the slaking of "fat" limes. It is important to consider this heat evolution with reference to fire danger.

It is easily possible for wood to be ignited by the heat evolved in slaking even "poor" or "lean" limes, for such limes, although poor in calcium oxide, may reach a temperature of 270 to 300 deg. C., at which point wood chars in air. High grade or "fat" limes are still more dangerous because in slaking, they can produce a temperature of 400 deg. or over.

In slaking lime, the weight of water that must unite with it in order to convert it into the hydrated form is 32.1 per cent. of the weight of the lime, assuming the lime to be absolutely pure calcium oxide. But, because the lime practically always contains inert impurities, somewhat less than this amount is theoretically required. On the other hand, some water is lost as steam, the amount varying with conditions. For mortar work, about twice the theoretical quantity of water is employed, the slaked product being then in the form of a stiff paste. For best results, it is important that the proper amount of water be added at once, not in portions and that it be distributed uniformly and quickly. A great excess must be avoided. If so much is used that the hydrated product is in the form of a thinly fluid paste, its binding power is apparently much lessened in the mortar made from it. This may be due to the fact that mortars made from such hydrated limes contain more water than is customary.

If the lime is wetted with enough water to start the hydration but not enough to complete it, the unhydrated portion becomes inert, being then described as "burnt." This condition may be brought about accidentally when partially slaked lumps of lime are pushed out of the water by the swelling of the mass beneath. Just what constitutes this "burning" seems not to be understood. If an insufficient amount of water is added in the beginning and then a further addition is made during the process, the slaked lime will be granular and lumpy. When properly slaked, the steam evolved by the heat of the reaction bursts the lumps and aids in the slaking. But if water is added during the process the evolution of steam is checked. Further, the added water causes a pasty coating of slaked lime to be formed on the surface of the lumps, which renders the entrance of water to the interior of the lumps difficult, if not impossible.

The bulk of the lime increases from 2.5 to 3.5 times during slaking, the more rapid the slaking the greater being the volume increase. Impure calcium limes, magnesian and dolimitic limes slake only about half as fast as the high-calcium limes and expand far less.

It has been observed, also, that the de-

gree of plasticity is much increased by rapid slaking, this being due to the fact that rapid slaking produces a colloidal hydrate, whereas slow slaking tends to produce the crystalline condition. The colloidal hydrate is produced very rapidly, but crystals require much more time to form. When the hydrated product is crystalline the volume is less, the mass is granular and gritty and the sand-carrying capacity is much reduced. The slaking reaction may be hastened by using warm water or by covering the slaking lime with a tarpaulin.

Magnesian limes are slow in slaking, and as has just been explained, slow slaking operates to form a less plastic product On this account magnesian limes can be mixed with less sand for use. Quite aside from its effect in lowering plasticity, magnesia is said to have a very marked effect in increasing the ease and smoothness with which the paste may be spread with a trowel. Magnesian limes will slake readily only if special care is taken to burn them at low temperatures.

The porosity of the lime, which results largely from the evolution of the carbon dioxide gas from the stone, is of importance in respect to the rate of slaking since it allows the water to enter more readily and the slaking to proceed more rapidly. All limes are not equally porous. High burning temperatures make denser limes. This is, at least partly, due to the fact that high temperatures cause some of the lime to unite chemically with the impurities present, thus producing silicates and aluminates of lime. These compounds are much more readily fusible than the lime and as they soften, close the pores of the stone. This fusion is especially noticeable on the outside of the lumps, where a more or less vitreous coating may form, particularly if the temperature exceeds 1,200 deg. Cent. to any extent. Limes in which the calcium oxide has reacted with the impurities are said to be "over-burned." This overburning, of course, is more likely to occur if the impurities are high. It is very difficult to overburn a pure lime because calcium oxide is a very refractory substance.

If mortar is made of lime that for any reason has been incompletely slaked, it is very likely to be defective, because the lime is almost certain to slake eventually and then blisters or more serious faults will show in the wall or other structure where the mortar is used.

Common Method of Slaking Lime.—In the ordinary practice of slaking, the lumps of lime are placed, usually in a water-tight box, in a layer from six to eight inches deep. A quantity equal to two, or two and a half times the actual volume of the lime (which is an amount a little greater than two-thirds the weight) is then poured on. This is about twice the amount of water theoretically required, but the excess tends to insure thorough slaking. If the slaking is properly carried out, the slaked product will be in the form of a stiff paste. One barrel of lime (230 lbs.) will make about eight cubic feet of such paste, which is frequently known as "lime putty." The paste may be kept almost indefinitely if it is kept from drying out. It is sometimes stored in casks or in the wide shallow boxes in which it is slaked. It cannot harden under water. The lime should be slaked at least one day prior to its use, in order that it may be more certain that the slaking is complete.

REPEATED QUESTIONS.

234—Gases.

What are the constituents, explosiveness and characteristics of these gases: Air, sewer gas, coal gas, coke oven gas, town gas, gasoline.

237—Water Heater Campaign.

What experience have gas companies had with direct mailing campaigns for the sale of automatic gas water heaters? What success? Were letters used or mailing cards and if so were these pieces mailed under regular postage covers or were they delivered by gas company employes?

238—Connecting Water Heaters.

What is the usual charge for connecting a No. 65 Pittsburg, a No. 4, 6 and 8 Ruud, Humphrey or Pittsburg? Are installations made with a view of making profit on installation work as well as heaters or on heaters only?

239—Labor Installing Heaters.

How many men would it require to install a No. 4 automatic gas water heater and how long on average reheating job? How long on average direct job?

240—Sale of Water Heaters.

What experience have gas companies in large cities had with direct mailing campaigns that were not coupled up with newspaper advertising? Could success be expected from campaigns consisting of mailing pieces only, with no newspaper advertising and no special window displays or store demonstrations?

241—Results of Heater Campaign.

What per cent. of automatic gas water heater sales are made by direct canvass; by customers calling at office; by prospects secured by mailing literature?

242—Automatic Heater Sales.

Do you believe that the average buyer of automatic gas water heaters can be reached by a house to house canvass?

243—Price Water Heaters.

What is the usual charge for automatic gas water heaters, list or list plus a fixed installation charge?

244—Fire-Proofing Wood.

What application can be made to wood to make it resist fire?

245—Graphite.

Is graphite, used as a refractory material, produced artificially or it is found in the natural state?

Gas Associations

American Gas Institute—Indefinitely postponed; meeting place Washington, D. C. Pres., Alfred E. Forstall, New York; Sec.-Treas., Geo. G. Ramsdell, 29 W. 39th St., New York.

Ass'n of American Gas Industries—Third week in February. Pres., John S. De Hart, Jr., Newark, N. J.; Sec.-Treas., Eugene Y. Sayer, 60 Wall St., New York.

Ass'n of Natural Gas Supply Men—May, 1918. Pres., David O. Holbrook, Pittsburgh. Sec., Larmour Adams, 1304 First National Bank Bldg., Pittsburgh.

Canadian Gas Ass'n—August, 1918. Pres., J. M. H. Young, London, Ont.; Sec.-Treas., G. W. Allen, Toronto.

Empire State Gas and Electric Ass'n—October, 1918. Pres., Stuart Wilder, Mt. Vernon, N. Y.; Sec., Chas. H. B. Chapin, 29 W. 39th St., New York.

Illinois Gas Ass'n—March, 1918, Chicago. Pres., F. W. Bedard, La Salle; Sec.-Treas., Horace H. Clark, room 1331, 72 W. Adams St., Chicago.

Indiana Gas Ass'n—April, 1918; Indianapolis. Pres., E. J. Burke; Sec., James W. Dunbar, New Albany.

Iowa District Gas Ass'n—Meeting postponed; place, Des Moines. Sec.-Treas., H. R. Sterrett.

Michigan Gas Ass'n—Meeting postponed; place, Grand Rapids. Pres., Glenn R. Chamberlain, Grand Rapids; Sec.-Treas., Clark R. Graves, Lansing.

National Commercial Gas Ass'n—Indefinitely postponed; place, Detroit. Pres., James T. Lynn, Detroit; Sec. and Asst. Treas., Louis Stotz, 61 Broadway, New York.

Natural Gas Ass'n of America—May 21, 22 and 23, 1918; Louisville, Ky. Pres., J. F. Guffey, Pittsburgh; Sec.-Treas., T. C. Jones, Delaware, O.; Resident Sec., D. O. Holbrook, Henry W. Oliver Bldg., Pittsburgh.

New England Ass'n of Gas Engineers—February, 1918; Copley Plaza Hotel, Boston. Pres., J. F. Wing, Everett, Mass.; Sec.-Treas., N. W. Gifford, 26 Central Square, East Boston.

New Jersey State Gas Ass'n—April, 1918. Pres., O. F. Potter, Newark; Sec.-Treas., Jacob Jones, Bridgeton, N. J.

Pacific Coast Gas Ass'n—September, 1918; Los Angeles. Pres., John D. Kuster, San Jose; Sec.-Treas., Henry Bostwick, 445 Sutter St., San Francisco.

Pennsylvania Gas Ass'n—April, 1918; Philadelphia. Pres., W. O. Lamson, Jr., West Chester, Pa.; Sec., L. R. Dutton, Jenkintown, Pa.

Society of Gas Lighting—December, 1917; New York; monthly meetings, second Thursday. Pres., Fred S. Benson; Sec., George G. Ramsdell, 29 W. 39th St., New York.

Southern Gas Ass'n—May 1, 2, 3, 1918; Chattanooga, Tenn. Pres., F. L. Marshall, Augusta, Ga.; Sec.-Treas., M. A. Bowlin, Macon, Ga.

Southwestern Electrical and Gas Ass'n—April, 1918; Galveston, Tex. Pres., H. C. Morris, Dallas, Tex.; Sec., H. S. Cooper, 405 Slaughter Bldg., Dallas.

Texas Gas Ass'n—October 15 and 16, 1918; Chamber of Commerce, Dallas. Pres., M. T. Walker, Beaumont; Sec., C. H. Seidenglanz, 1501 Commerce St., Dallas.

Wisconsin Gas Ass'n—March, 1918; Hotel Pfister, Milwaukee. Pres., B. F. Lyons, Beloit; Sec., Henry Harman, Milwaukee.

Cincinnati May Feel Natural Gas Shortage.

Possibilities of a natural gas shortage in Cincinnati during the coming winter loom up as a result of the high price and shortage of coal, as revealed in Mayor Puchta's report to J. M. Roan, Director of the Coal Clearing House, Columbus.

MANAGEMENT

Condition of the Industry

Coal Shortage, Toluol Recovery Needs, Rate Problems and Labor Shortages Are Common to All American Gas Companies at This Period

Reports from gas companies in various sections of the United States at this period afford an excellent opportunity to obtain a general and more or less accurate view of the condition of the gas industry. There are half a dozen or more serious problems to be solved by the industry as a whole, the early solution of some of which involves not alone the safety of the companies themselves but possibly that victory in war which the United States is striving so earnestly at this juncture to win.

The problem of coal supply is first in importance among those facing the industry today, according to the latest reports, while that of toluol recovery for keeping the government's munitions stores stocked with high explosives is undoubtedly one of the most essential in the list to be considered.

The very grave situation arising from the increased costs of all materials used in manufacturing gas is common to the entire industry and in many instances it threatens to plunge the harried company into bankruptcy. Shortage of labor, dearth of trained men in the works and in the commercial departments and over-taxed plant capacity also are common difficulties throughout the industry, regardless of geography. The dwindling coal pile, or reserve stock necessary to the maintenance of an adequate gas supply, is so nearly unanimous among all companies that it is hardly necessary to mention the localities where it is most plainly seen. In Chicago, Detroit, Schenectady, and other prominent manufacturing cities the scarcity of the coal supply has forced gas company executives to appeal to the government for relief. The boards at Washington in control of the public utility and the coal and railroad industries have promised their immediate co-operation to meet this condition in the gas industry; and with the added efficiency which time and experience is giving those overworked authorities there is reason to believe that relief will be forthcoming in time to save the pleading companies from the threatening disaster of a shut down of their plants.

Toluol Recovery.

The situation in regard to recovery of toluol continues in a rather chaotic state. Over this situation still looms the government's demand, as expressed by General Crozier, of the ordnance department, and his representatives, for a 100 per cent. increase in the present output of this vital chemical. Then, too, the government's bureau of standards has just issued its report on the research work of the various methods for extracting toluol from coal gas and water gas. When this report is received and digested by the engineers of the industry, undoubtedly it will stimulate activity in this field and it may be the means of solving this toluol problem. It is generally known, too, that the government has declared its readiness to insure gas plants against loss in the installation of apparatus for this work.

Against these favorable influences must be set up the antagonistic attitude of a majority of the state and city authorities in control of gas companies. The New Jersey board of public utility commissioners, for instance, has recently denied the Jersey companies the right to reduce the calorific standards, either for greater toluol production or to meet the rising costs of materials. The board held that the proofs submitted on the question of additional costs were meager and not sufficient to convince it that the cost of producing gas of present standard is, under ordinary conditions excessive, and that if abnormal conditions at present render rates now charged no longer just and reasonable, there should not be a substitution of an inadequate standard of gas for the present requirements, but a direct application on the part of the companies for a sufficient rate.

The New York Situation.

New York gas companies have been given permission to lower the standard but at the same time were ordered to reduce rates to such a figure that it would be impossible for the companies to comply with the order. The Brooklyn Union Co. objects to the standard of 650 thermal units set by the commission, asserting that it now furnishes only 636 thermal units to produce a 22.2 candle power gas. It states that an estimate has been made that if the standard were fixed at 600 British thermal units, the Brooklyn Union Gas Co. would be able to deliver to the United States government 200,000 gallons of toluol a year. Under the order of the commission the petition states that the price of gas would be decreased between 5 and 6 cents per thousand cubic feet, and the consumer now paying 80 cents per thousand cubic feet would pay less than 75 cents.

It contends that if the United States government makes up this amount, the cost of toluol would be increased $1 per gallon by this one item, raising the price approximately from $1.50 to $2.50.

The petition adds that "the company is not now earning a minimum fair return upon its invested capital, and that the effect of the order would be to reduce the amount received by the company for the sale of gas at least 3 per cent. at a time when the cost of manufacture has increased by from 10 to 15 cents per thousand cubic feet."

Difference in St. Louis.

In St. Louis quite a different state of affairs permit the Laclede Gas Light Co. to reduce the heat standard of gas sold in St. Louis. The reduction will be made on the specific ground that the company may comply with the request of the war department for a large output of toluol. It was explained that the reduction in heat standard would not be noticeable to householders. The company now produces 150,000 gallons of toluol a year and will build special plants to extract 160,000 gallons additional.

The action of the Laclede company was suggested by the war department. Major

J. H. Burns, of the ordnance bureau, wrote Major Kiel a letter requesting co-operation of the city with the gas company in the interest of the war department.

"The war department finds it imperative," he said, "to develop the capacity of the country for the production of toluol to a much greater extent than now exists

While most of the by-product coke plants and some few gas plants are recovering this material from their gas the amount so obtained is considerably less than the estimated requirements for the next year.

"It is, therefore, a very important military necessity that we arrange with many gas companies throughout the country for the installation of apparatus to recover and refine toluol to be used in the manufacture of high explosives during the present emergency."

It may be that this action of Mayor Kiel, of St. Louis, is but the first of a number to be instituted along similar lines at the suggestion of national authorities. The pressing need for action of this sort is now plainly apparent everywhere. The New York Times, in a recent editorial, uses this argument on the subject:

"If everybody who uses gas understands that one of its by-products, toluol, makes, when treated with nitric and sulphuric acids, 'T. N. T.,' (trinitrotoluol), one of the most powerful of the high explosives, and that the United States army in France must depend upon the gas plants of the country for toluol if the Germans are to be shelled out of their trenches, then the American people will demand that every obstacle to what the chemists call the recovery of toluol at the gas plants be swept aside; moreover, that a beginning in getting out this indispensable by-product be made with no delay.

Obstacles in the Way.

"The obstacles may be enumerated as follows: Reluctance of public service and public utility commissions which regulate the business of making and selling gas to fix a lower standard, as proposed by the companies which are willing to produce toluol and say that it cannot be done unless their application is approved; hesitation on the part of some of the companies to make the necessary additions to their plants from a fear that the government will fail to assume the investment risks; outcry by customers that if the thermal standard is lowered their gas will not be as good and the companies, refusing to reduce the price of it, will make profits at their expense. The public service commission of the second district, this state, has decided to enable the gas companies to recover toluol. The commission in the first district is now holding hearings to decide whether there shall be the change in the thermal standard desired, and Chairman Straus and his associates are inclined to give their approval, provided the interests of the consumers are protected.

"There should be no difficulty about this. It can hardly be the case that the companies would undertake from patriotic motives to furnish the government with this high explosive constituent and conspire, at the same time, to fleece the consumer. As to the consumer, can there be a doubt that he stands ready to put up with a slightly poorer quality of gas and forego a slight reduction in the price if the compensation shall be the piling up of many more thousands of shells on the western front to smash the German trenches and to intensify the American barrage fire when the boys go 'over the top'?

The New Jersey Decision.

"Unhappily, the board of public utility commissioners of New Jersey has lately gone on record as opposed to fixing a lower thermal standard for gas to make it practicable for the companies to build plants to recover toluol. One of the board's reasons was that the federal government had not represented that the heating value of gas must be lowered in order to obtain the supply of toluol needed. This seemed to beg the question. The chemists, we believe, have already demonstrated that the condition asked for is essential. Also the New Jersey board declared that it owed a duty to the consumers. That may be admitted, but the consumers are willing to make sacrifices. The commissions and boards are surely competent to protect the consumer in the last analysis.

Government Reimbursement.

"As to the misgivings of the companies in regard to their reimbursement by the government if toluol recovery plants are put in, General Crozier of the ordnance department has announced that the government is in a position, with ample funds at its disposal, to underwrite and secure investments by the gas companies, and will agree to do so. So there need be no walking the floor on that score.

"Away with the delay in this matter! Each day of inaction means, it is said 'a waste of "T. N. T.," sufficient for 150,000 three-inch shells.' It takes three to four months to build the recovery plants. According to General Crozier, 22,400,000 gallons of toluol should be available by September, 1918, for our mobile artillery alone. Now the fact is that all the toluol obtainable from the twenty-two billion cubic feet of gas now made in this country annually would be only half of the quantity the army will need. All the more reason, then, why the gas companies, upon which the army depends because the yield of every other source of supply belongs by contract to the navy and our allies; all the more reason why public service commissions, the gas companies, and the consumers' representatives should get together and see that the American army shall have its whirlwind preparation and its barrage fires at the front in France."

The Rate Problem.

The rate problem at present is general over the country, with here and there instances wherein the public and its political representatives are co-operating with the companies in an effort to mitigate the attendant difficulties. In North Carolina the public utility commission set aside a franchise rate for a gas company and permitted a higher rate because the rising costs of materials and the growing deficits in the company's balance sheets simply could not be overlooked. In Michigan, on the other hand, a community under the commission form of government refused to vote its gas company the right to raise its rates, although the same increasing costs and the same growing deficits as those in North Carolina prevailed. The general situation in this respect, with a suggestion as to relief is set forth in a statement issued last week to its members by the council of the Iowa District Gas Association. It is as follows:

"Due to the abnormal increases in the cost of practically all the materials used in manufacturing and distributing gas, many gas companies now are, or in the near future will be in a position where their present rates will be insufficient to allow them to operate with any profit, which means that it may be necessary for many companies to temporarily discontinue manufacturing gas. The thought of your council is expressed in the following resolution which was adopted at the recent meeting.

Educate the Public.

"'Resolved, that the council of the Iowa District Gas Association in meeting assembled, October 9, 1917, does hereby recommend to the members of the association that they at once take steps to advise the public that the increased cost of coal, coke, oil, labor and all other supplies and equipment entering into the manufacture of gas makes it impossible to give the gas consuming public the quality of product and service given in the past unless some relief be immediately provided. We recommend that a campaign of education be immediately started to advise the public of these conditions and that it is necessary to temporarily increase

the price of gas in order that good gas service may be continued. We further recommend that the American Gas Institute and National Commercial Gas Association immediately institute a national campaign of education in order that the gas consuming public may be advised of the necessity of such temporary increase.'

"As a gas man or as a manufacturer or salesman of gas burning appliances you cannot help but be interested in the critical condition which the industry in many situations now finds itself, and it is hoped that you will personally do everything you can to promote this campaign the object of which is to bring before the public the reasons why a temporary increase in gas rates is necessary."

One Association Needed.

With these difficulties besetting its pathway, the gas industry is perhaps very fortunate in having practically consummated very recently its plan to merge its two national associations into one compact, energetic and mobile organization that will be capable of handling just such problems as the industry now faces. The formal action by which this single association is to be created cannot be taken any too soon, in the opinion of the best posted gas men. The present rather chaotic state of things is largely due, it is pointed out, to the fact that the two associations have progressed along, each wrestling with those problems directly connected with its particular field of operation in the industry, while little concerted activity has been directed to the handling of these problems confronting the gas industry as a whole. One association, formed of these two, would safeguard the welfare of the industry, it is argued, in addition to handling the problems peculiar to each department of the business.

Let the amalgamation proceed, then.

Official U. S. Publication on Standards of Public Utility Service.

The United States Bureau of Standards has issued an outline of work which has been done in a study of the standards of good practice and good service as applied to public utilities. The bureau has been engaged for several years on this subject, and the resume that is here offered is accompanied by lists of the publications that have been issued by the bureau on the various divisions of the work. The branches of the main subject include standards for electric service, standards for gas service, standard methods for gas testing, national electrical safety code, electrolysis mitigation and other activities. Copies of this outline, circular of the bureau of standards No. 68, "Public Utility Service Standards of Quality and Safety," may be obtained at five cents each from the superintendent of documents, government printing office, Washington, D. C.

For Education

N. C. G. A. Issues Strong Appeal on Exceptional Opportunity at Hand

Men at the head of our government, says the N. C. G. A. "Bulletin" for December, are declaring that every single trained man added to our man-power is extra help in winning our fight. President Wilson says, "There will be need for a larger number of persons expert in the various fields of applied sciences than ever before. Such persons will be in need both during the war and after its close." There will be two serious conflicts to be fought after the treaty of peace which ends the world war has been signed. One of them will be the conflict of business with unsettled conditions, changes in prices and demand, large numbers of unemployed men affecting the labor market, upheavals and disturbances of every kind. If the draft is making itself felt now, remember what the mustering out of these same men will mean later. The other will be the struggle of the individual man to find or to keep his place in the general shifting of forces. What will be the key that will enable both the company and the individual to control the situation to the best advantage? President Wilson says "trained men." Presidents of big foresighted corporations whose experiences cover periods of years and dealings with large numbers of employes, say "trained men."

If you are the manager of a gas company, the question comes directly to you. What are you doing to meet the need for trained men in your organization? The Henry L. Doherty Co. has offered to pay 75 per cent. of the tuition of any of its employes who finish satisfactorily a N. C. G. A. course. Up to November 3, fifty-six Doherty men had enrolled and Mr. Pratt, field representative of the association in educational work, has calls from seven different Doherty situations to explain the work and get the men started.

The board of directors of the association feels so strongly the need for urging special classes in gas subjects in all gas companies that it has decided that the association shall make special efforts now to reach all gas men and to explain the nature of the work offered to all situations. Mr. Pratt has planned a four weeks' trip through the South and middle West. He will meet both managers and men and his efforts will be to interest gas companies in the proposition of educating their best men, and to get gas men started on the courses that will bring both them and their employers the greatest results. Mr. Pratt will visit the following towns:

Bristol, Tenn., Knoxville, Tenn., Meridian, Miss., Hattiesburg, Miss., Montgomery, Ala., Mansfield. O., Tonawanda, N. Y., Chattanooga, Tenn., Birmingham, Ala., New Orleans, La., Mobile, Ala., Indianapolis, Ind., Chicago, Dixon, Ill., Hammond, Ind., Rockford, Ill., Minneapolis, Minn., St. Paul, Minn., Madison, Wis., Rochester, N. Y., Syracuse, N. Y., Utica, N. Y., Albany, N. Y., Troy, N. Y.

We suggest that every gas manager make a selection of the employes in his commercial department who will profit by systematic training and enroll them at once, continues the "Bulletin."

No gas company is too small or too big to avoid the issue. Henry L. Doherty has set the most recent example. Public Service Gas Co. has some 500 students in these courses. All told, there are over 1,400 men from 250 gas companies now in training.

A letter to the association will bring further information and suggestions for financing the plan. If a sufficient number of men in any one situation are enrolled, the association will send its field representative, at its own expense, to organize the men and outline the work for them.

The president of the Baltimore Consolidated Gas Co. says: "At no time in the world's history has education been so great an asset as now. Your advancement depends upon your own efforts and fitness." There is still time, before the great moment of crisis for the gas industry and the individuals who make it up, to acquire that training which will make for war-time and after-war success. The association stands ready to help in both the national and the individual struggle to the utmost of its resources.

Indiana Commission Denies Association Petition.

The Indiana public service commission at Indianapolis, in October, dismissed the petition filed by the Indiana Gas Association several months ago, asking for permission to reduce the standard of heat units in gas from 600 British thermal units to 550. The companies wished to reduce the heat units of their gas in order that they might extract toluol from which the government is to make munitions.

A NEW CONDITION.

Industrial Gas Fills Vacancies in Labor Ranks Made by the Army.

By W. L. Powers.

Today in the several camps and cantonments throughout the country is an army of 1,500,000 men answering the call of justice and freedom. This vanguard of our National Army comes from the ranks of industry and is composed of executives, artisans, mechanics and professional men and their entering the service has increased the production problem of the manufacturers, who have not only to maintain the present rate of production, but must increase it to meet the changing conditions of the times.

One of the first problems with which the American manufacturer is confronted will be to fill the vacancies caused by the withdrawal of skilled labor, which will necessitate the utilization of unskilled labor, both men and women. This, in turn, brings about a new condition as compensation and liability laws make no provision for this extraordinary problem. There is added to the burden of the manufacturer, therefore, the necessity of safeguarding in every manner the lives and health of his employes.

How best can this be done? A review of the many articles appearing in recent issues of the GAS RECORD and other journals will convince us that industrial fuel gas has been the salvation of industry in European countries, for not only has it solved to a very large degree the question of safety, but owing to its greater efficiency as a fuel, it has also solved the problem of increased efficiency and production. A brief review in our own country of the many operations which are becoming more dependent upon industrial fuel gas again demonstrates its relation to the many complexing problems developing from present day conditions, viz: Manufacture of shells, band instruments, shoes, treating of woolen piece goods, heat treating of steel entering into the manufacture of war munitions and chemical processes for high explosives.

Conservation of energy and material is being advocated in every line of industry and endeavor, and it is a very well established engineering fact that coal converted into gas greatly conserves its natural energy, consequently coal converted to energy and distributed from a central station, as is gas, conserves labor, transportation facilities and storage space. Many points of advantage in the use of industrial fuel gas could be advocated, such as safety, cleanliness, saving in raw materials (due to its perfect control in the hands of inexperienced labor). Gas rates are established and relieve the manufacturer of the loss and annoyances of a fluctuating market. Again, the manufacturer, instead of investing in and storing his fuel, pays for it after it has produced marketable products of his plant.

Gas men should take advantage of this opporunity of doing their bit as in most cases gas mains and services are already connected to plants and a successful installation of industrial gas will demonstrate conclusively the superiority of gas as a fuel, and will result in continued consumption under normal conditions.

THE MARKETS.

Pipe Prices Fixed—Sales of Benzol Increase—Shortage of Toluol for Explosives.

The discount of 52 and 5 and 2½ per cent., Pittsburgh, established by the government on black steel pipe, base size, is a compromise between the April 2 card of the National Tube Co., providing a discount of 56 per cent. off, and the May 1 card of independents, providing a discount of 50 per cent. off. The June 18 cards of independents were advanced to 43 off. The government price represents $8.92, Pittsburgh base. The published price of steel pipe is now 51 off for black and 37½ off for galvanized. Producers of iron pipe, as a result of the steel pipe price being fixed, have published cards continuing their June 30 prices of 33 off for black and 17 off for galvanized. These cards are published as of November 7 and are merely meant to notify the trade that iron pipe prices remain unchanged. A considerable volume of inquiries has arisen under the new conditions.

Sales of benzol have largely increased the past week. Numerous spot sales, involving as much as 100,000 gallons, were made, and several contracts for unusually large quantities for 1918, were closed. The market now is quoted at 44 to 49 cents per gallon both for spot and contract. Toluol is quoted at $1.70 to $1.80, spot; solvent naphtha, at 17c to 20c, and sulphate of ammonia at $4.90 to $5.05 per 100 lbs. seaboard. The greater portion of the toluol output of the country now is going into trinitrotoluol for the government and the available supply is not sufficient to fill all requirements. Accordingly, plans are in formulation for the substitution of other coal tar products for making high explosives.

Warren S. Blauvelt Is Appointed Government Coke Director.

Warren S. Blauvelt, of Detroit, formerly consulting engineer of the Semet-Solvay Co., has been appointed coke director under Fuel Administrator Garfield. R. H. Knode, of the National Fuel Co., Pittsburgh, will handle the fuel needs of the steel mills. The question of differentials on coke now is being considered by the fuel administration. It is intimated that the present price of $6, Connellsville ovens, will be cut to $5, Connellsville ovens. The fuel administration admits the coke situation as affecting blast furnaces, steel mills and gas plants is serious.

A JAPANESE VISITOR.

K. Fujimoto, of Nagoya, in U. S. To Study Various Gas Applications.

The gas industry of Japan very likely will experience a decided forward movement when J. Fujimoto, of Nagoya, returns to the land of cherry blossoms. He is now making a tour of the larger gas companies in the United States, with side trips to the factories of the well known appliance makers, and being superintendent of the gas works at Nagoya, one of the largest of the Japanese plants, the results of his researches in this country undoubtedly will be transmitted in due time to the whole industry in Nippon.

"The Japanese have not adopted gas service in their homes to the extent that Americans have," he said during a visit to THE GAS RECORD office early in November, "but we hope to develop our industry over there to the same degree that you have over here. It is for the purpose of studying the application of gas in its one thousand uses that I came to this country.

"In Japan there are now eighty gas plants, all coal gas plants. Our coal is secured from Japanese mines, and at the present time we pay $12 per ton at the plant. Most of our appliances are English, including water heaters, radiant gas fires, and ranges, though in Nagoya, with 25,000 consumers, we use a great many 'Vulcan' appliances, made in this country. We find them most satisfactory, and if transportation rates and facilities permit we expect to use more of the American made domestic and industrial appliances in the future. Gas in the industries is one of the growing departments of our business."

Mr. Fujimoto speaks English fluently, though he has never been in an English speaking country before. He will have spent three months in the United States when he sails from San Francisco the latter part of this month.

A. H. Warner, in charge of the drafting room of the United Gas Implement Co.'s construction department, died in Philadelphia, November 5, at the age of 62, after an illness of more than a year. He came to this country from England in 1885 and entered the employ of the firm of Granger & Collins as a constructing engineer. From 1886 to 1888 he was superintendent of the Johnstown and Gloversville (N. Y.) Gas Co. In 1888 he took the position of chief draftsman in the U. G. I. construction department. Mr. Warner, while not a member of a gas association, was well known to many of the fraternity and had hosts of friends among his fellow employes. He leaves a wife whom he married in 1887.

Small Company Collections

Methods Used by One Gas Company Which Successfully Reduced Delinquent Accounts and Still Retained Good Will of Its Consumers

By Wm. H. Matlack

The remarks on the above subject are not written with the idea that I have discovered an ideal method; but solely to show forms used by one small company which gave a good measure of results.

The public service company like the merchant has two objects in making collections—to get the money, and to keep the customer in the proper humor or to retain his good will, especially in these days of municipal ownership. One is equally as important as the other and for that reason we must, as some one has said, "worry along with them"—as we realize that the loss of either may make or break us.

Our method of billing regularly and promptly on the first of each month was the same as used by most other utility companies. We sent the regulation for current month, and if consumer was in arrears we used a rubber stamp, "Please Remit," or such as shown in Fig. 1.

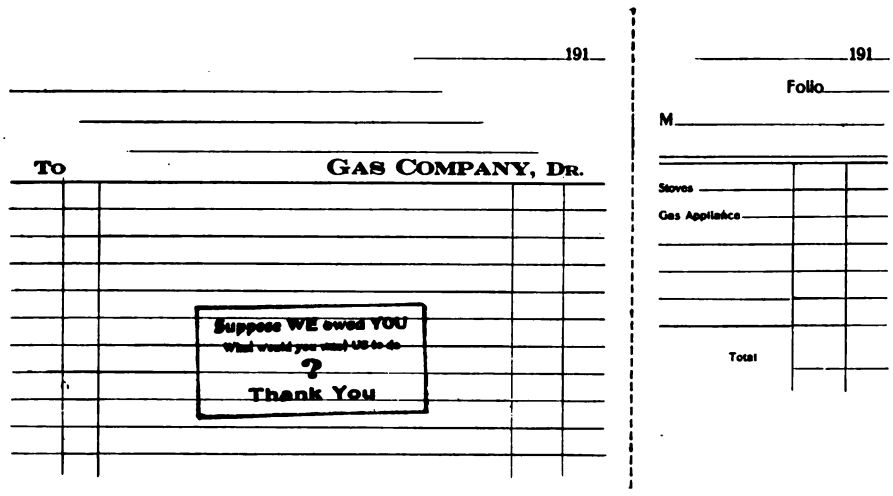


Fig. 2—Form for Merchandise Bills.

Merchandise Bills.

The merchandise bills also were sent out the first of each month with the gas bills and where a customer was slow the rubber stamp as shown in Fig. 2 was used. While I am not "keen" on the use of rubber stamps I do believe when used in this connection they gave us good returns. We also used one marked "Thank you!" on receipts; a slight courtesy which always pays.

The card shown in Fig. 3 was used when for any reason a customer did not "come up" to his agreement—this as well as the other forms were sent in plain envelopes under two-cent stamp as first class mail.

Fig. 4 is the first card sent on or about the 10th of the month. We took the stand that if the customer intended to pay up promptly he would do so within the discount period, which was from the 1st to 10th of the month.

Final Notice.

Fig. 6 shows the "red slip" which was sent five days after Fig 4, and advised the consumer that unless he paid up we would be obliged to discontinue our service. We usually granted five days, and on the day the meter was to be removed if payment, and in some cases part payment was made we permitted the meter to remain in service.

The following copies of letters (A, B, C and D), give an idea of the style used in requesting consumers to pay up. You will note that they are all written to retain the good will of the delinquent, "The Public be Pleased."

Form Letter A.

We wish to call your attention to

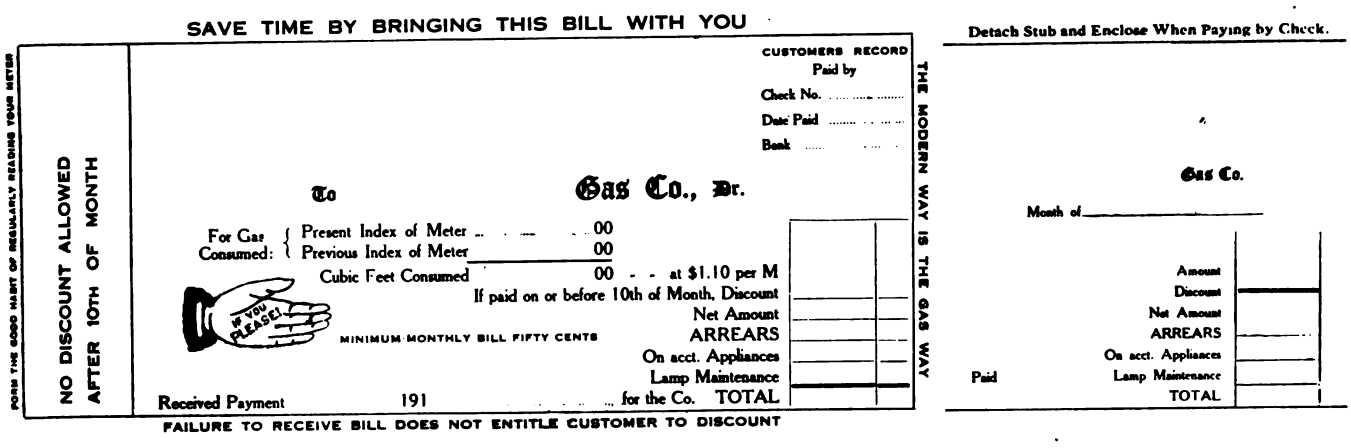


Fig. 1—Note the Use of Rubber Stamp for Collecting Delinquent Accounts.

your gas account to May 1st, amount $....., and would be much obliged if you would favor us with check to cover same by the 20th.

Yours very truly,

——— Gas Co.

Form Letter B.

We know you appreciate that in our business there are times when we are obliged to follow up collections more closely than usual, and this month we feel compelled to call upon our friends to be as prompt as possible in favoring us with a remittance to cover the past due portions of their account.

As we are in urgent need of funds to take care of our current bills, we shall very much appreciate your valued assistance.

Your gas account amounts to $.....

Your appliance account amounts to $.....

Yours very respectfully,

——— Gas. Co.

Form Letter C.

We wish to remind you that you have not paid your gas bill for September. Your bill was delivered the first of November, which called for consumption for October, as well as showing arrears for September's consumption. Kindly let us have this remittance before Friday next, 20th.

Being against the rules of our company to allow these arrears, we trust you will understand and let us have your prompt attention to the above.

With our kindest regards, we beg to remain,

Very truly yours,

———Gas Co.

The amount of your

September bill $.....

October bill $.....

Form Letter D.

This is to bring before you the fact that your remittance covering your delinquent gas arrears has not been received at this office. We will kindly ask that same reach us before Monday next—twenty-fifth, and very much oblige.

Yours very truly,

———Gas Co.

DATE_____191__

NAME_____

ADDRESS_____

DEAR SIR:

This is to call your attention to the fact that, as per your agreement, you are not keeping up your installments on your_____.

At this time there is a balance due, as per your agreement, of_____.

Kindly give this your immediate attention, and very much oblige,

GAS COMPANY.

Fig. 3.

Folio

191

M

Your GAS BILL for

amounting to $ remains unpaid. Will you please send the amount to this office at an early date and oblige.

Very truly yours,

GAS COMPANY

Fig. 4.

LOSES IN ELECTION.

Port Huron Company's Appeal for Higher Rates Is Denied. at Polls.

The Port Huron (Mich.) Gas & Electric Co. lost its appeal to the voters of Port Huron October 29th, when it asked for permission to raise its rates from 85 cents to $1 per 1,000 cu. ft. The vote in the primary stood 709 for granting the company's request, and 1,995 against the plea.

The result of the election was not due in any degree to the company's lack of enterprise or any failure on its part to thoroughly inform the people of Port Huron on the necessity for increased rates if the gas plant continued in business. The most active and intelligent publicity campaign conceivable was conducted for weeks and it would seem that every voter in the city who could read print must have had the facts clear in his mind. The only explanation of the result is that it was not possible to persuade gas consumers to vote to raise their gas rates, no matter how pressing the necessity.

Folio_____ Date_____191__

MR._____

_____

DEAR SIR:

Your gas bill for the months of_____ amounting to $_____ is past due and unpaid. Please send the amount due to this office on or before the_____instant, or we shall be obliged to discontinue our service to you.

Respectfully,

[redacted] GAS COMPANY.

Fig. 5.

Manager B. J. Graham for the company, in an interview published after the election, said:

"The gas company has no regrets. We put the matter squarely up to the people. We told them we could not run; that we could not supply 85 cent gas. The result of yesterday's voting has not changed the facts. I think the taxpayers made a wrong decision. Every voter has an equity in the 85 cent franchise. We asked for temporary relief, otherwise we would be forced to quit. Thus the franchise may be worthless. The company will continue to operate as long as able to meet the payrolls. That is as much as I can say. We appreciate the clean manner in which the election was conducted. We have no fault to find. We appreciate the co-operation and hearty support of the business men and citizens who stood with us throughout the campaign."

North Carolina Commission Sets Aside Franchise Rate.

An important decision by the Corporation Commission of North Carolina, recognizing the necessity for increased rates for gas was rendered October 30th. By this decision the Southern Gas Improvement Co., in Elizabeth City, is permitted to raise its rates notwithstanding the fact that its franchise fixed a maximum rate. The decision therefore sets a precedent. Under the franchise, the rate has been $1.60 gross and $1.50 net per 1,000 cu. ft. up to 5,000 cu. ft. after which a sliding scale was in operation. The decision of the commission, with the higher rates allowed, is as follows:

"The Southern Gas Improvement Co., asks authority to increase its rates for gas in Elizabeth City, on account of the very great increase in cost of coal, coke, oil and other materials used in the manufacture of gas, and the increase in cost of labor, and all other items of expense entering into the manufacture and distribution of gas in Elizabeth City. Its statements of operation show deficits, not including any dividends or interest on bonds as follows; for the year 1915, ... ; for the year 1916, ... ; and for the nine months of 1917, ... After full investigation and hearing, it is,

"Ordered, That, effective November 1, 1917, the Southern Gas Improvement Co., be and it is hereby authorized to charge rates for gas at Elizabeth City, not exceeding the following schedule:

For the first 1,000 feet, $1.90 per thousand.

Above 1,000 feet and up to and including 5,000 feet, $1.70 per thousand.

Above 5,000 feet and up to and including 10,000 feet, $1.50 per thousand.

Above 10,000 feet and up to and including 15,000 feet, $1.30 per thousand.

Above 15,000 feet and up to and including 25,000 feet, $1.10 per thousand.

All over 25,000 feet, $1.00 per thousand.

RECENT PATENTS

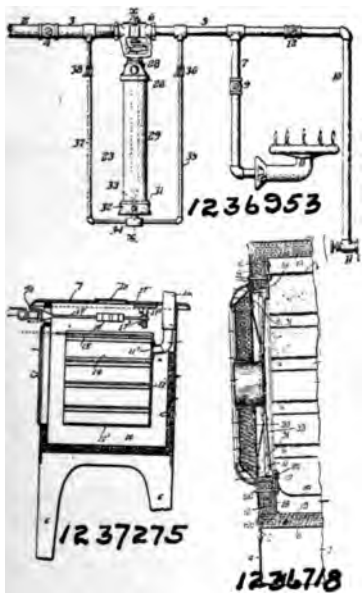
By R. S. McBride, U. S. Bureau of Standards

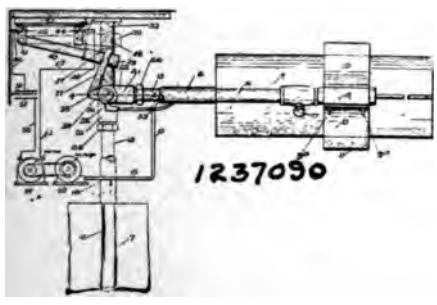
Patents on subjects of interest in the gas industry were granted on the dates indicated. The page in the Official Gazette of the United States Patent Office of these dates is shown in parenthesis for each patent. Numbers marked thus (*) are illustrated. Printed copies of patents are furnished at 5 cents each by Commissioner of Patents, Washington, D. C.

Patents Granted August 14, 1917

1,236,656. GAS FIXTURE. Harry A. Bauer, Lansdowne, Pa. The combination of a valve, a plurality of burners, controlled by said valve, a depending shank for operating said valve, and a detachable tassel surrounding said shank and depending below the end thereof, whereby the shank is completely concealed.

1,236,718.* OVEN. William J. Keep, Detroit, assignor to the Michigan Stove Co., Detroit. An oven comprising inner and outer shells having a doorway, a thin steel frame forming the doorway of said oven, an inner door plate held against said steel frame, a door for the doorway





of said oven, and a yieldable member carried by said door and adapted to engage and seal said door plate.

1,236,885. APPARATUS FOR DESTRUCTIVE DISTILLATION. Stewart E. Seaman, Brooklyn, N. Y., assignor to Seaman Waste Wood Chemical Co., Inc., New York. An apparatus for continuous distillation of wood or other similar material comprising a continuously operating retort, a valveless passageway for feeding the retort, and means for compressing material while in a finely divided state in said passageway to expel air therefrom, and continuously to force such material while thus compressed through the passageway into the retort.

1,236,917. METHOD OF RECOVERING RESINS FROM BENZOL PLANT RESIDUES. Marc Darrin, Wilkinsburg, Pa., assignor to H. Koppers Co., Pittsburgh. The method of recovering benzol plant residues, consisting in dissolving the residues, distilling the solution, and blowing a gaseous fluid through the solution.

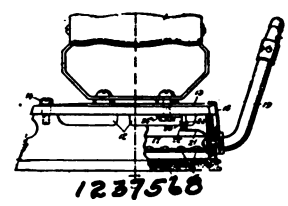
1,236,953.* AUTOMATIC REGULATOR FOR GAS SYSTEMS. Herbert F. Lewis, Philadelphia, Pa.

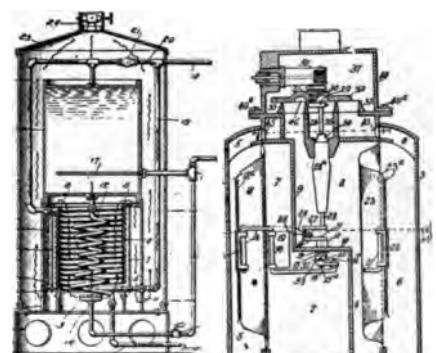
1,236,985. STOVE. Charles G. Rowlette, Grand Rapids, Mich., assignor, by mesne assignments, to Forest V. Detwiler, Pottstown, Pa.

1,237,090.* GAS FURNACE. Ross M. G. Phillips, West Haven, Conn., assignor to the Sentinel Mfg. Co., New Haven, Conn. In a swinging gas furnace having automatic gas and air control, the combination with a heating chamber, of means for mounting the same to swing into active and retired positions, a gas valve controlled by the swinging of the chamber to turn on and shut off the gas when the chamber is swung into its active and retired positions respectively, and an electric switch for opening and closing the circuit to the motor of an air pump, and also operated by the swinging of the chamber.

Patents Granted August 21, 1917

1,237,275.* GAS STOVE. Arthur L. Bailey, Jamaica Plain, Mass.





1,237,343. GAS HEATED STEAM RADIATOR. Walter M. Keighler, Philadelphia, Pa.

1,237,568.* SELF-HEATING SAD IRON. Otto Spahr, Philadelphia, Pa.

1,237,737.* WATER HEATER. Homer S. Albert, Mercer, Pa.

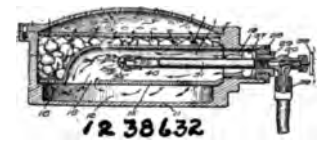
1,237,767. PROCESS OF PURIFYING GAS. Willard O. Felt, Brooklyn, N. Y. A process of the nature disclosed, which comprises compressing to a pressure of approximately 300 pounds per square inch a fluid mixture comprising a gas, mixing said mixture with glycerin while under compression, and reducing the temperature of the resultant mixture to approximately 60° F. while under compression, thereby separating glycerin and contained impurities and liberating the gas in a relativley purified condition.

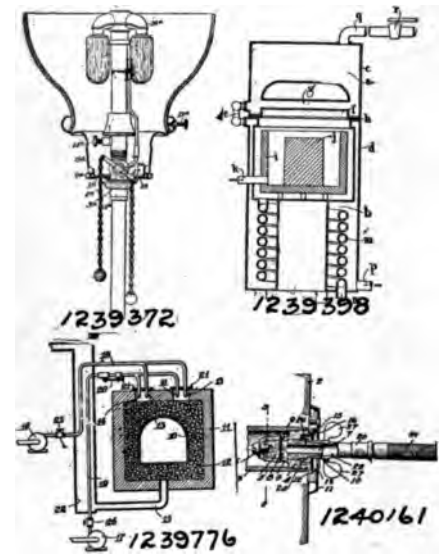
1,237,780. GAS BURNER FOR FURNACES. John Hicks, Calgary, Alberta, Canada.

Patents Granted August 28, 1917

1,238,453.* GAS METER. Henry H. Sprague, Bridgeport, Conn.

1,238,463. DETACHABLE DIAPHRAGM FOR





GAS METERS. Ernest M. von Krusenstjerna, St. Paul, Minn.

1,238,632.* BLUE FLAME GAS BURNER. Israel H. Caister, Los Angeles, Cal. A gas burner, comprising a housing, a burner grate thereover, means for conveying gas and air within the lower part of the housing, a heat chamber within said housing and through which the gas and air must pass, non-inflammable particles within said chamber adapted to combine the gas and air in a homogeneous manner, a superheating chamber above said heating chamber, and means whereby the gas flowing from the heat chamber will be retarded within the superheating chamber.

Patents Granted September 24, 1917

1,239,398.* APPARATUS FOR HEATING WATER AND OTHER LIQUIDS. Alexander Constantine Ionides, Jr., London, England.

1,239,377. FUEL ECONOMIZER. Ernest H. Foster, Dongan Hills, N. Y., assignor to Power Specialty Co., New York.

1,239,372.* Globe Holder for Incandescent Gas Lamps. Robert E. Ewing, Gloucester, N. J., assignor to Welsbach Co., Gloucester, N. J.

1,239,346. Gas Log. Eugene S. Brown, Oak Station, Pa.

Patents Granted September 11, 1917

1,239,681. Gas Burner. Andrew J. English, Cincinnati, Ohio, assignor to George J. Uckotter, Cincinnati, Ohio.

1,239,776.* Process of Producing Heat. Carleton Ellis, Montclair, N. J., assignor to Radiant Heating Limited, Armley, Leeds, England, a corporation of Great Britain. The process of producing heat which comprises injecting into a highly heated porous and permeable bed of refractory material currents of gas and air to commingle within the bed and to cause combustion to take place adjacent the highly heated interior surfaces of the bed at the points of confluence of the gas and air, and positioning the points or places of confluence of the gas and air with respect to the preignitive characteristics of the gas and the respective temperatures of the gas and air.

1,240,161.* Wall Gas-Cock and Coupling. Frank W. Olds, Bismarck, N. D.

N. C. G. A. Directors Inspect Welsbach Factory.

Accepting an invitation presented by Chas Wardell, at the Canadian meeting in Toronto, the directors of the N. C. G. A. met Oct. 19th at the Bellevue-Stratford, Philadelphia. The business before the directors was routine in its nature. The directors after the meeting took the opportunity to make a tour of the Welsbach Co.'s gas lighting plant wonderland in Gloucester. In the evening they were the dinner guests of Sidney Mason. Those present were Jas. Lynn, president; Louis Stotz, secretary; Harry Schutt, C. W. Bennett, C. A. Monroe, W. W. Barnes, H. D. Schall, Griffin Gribbel, Ed Bartlett, C. W. Wardell, W. M. Crane, J. C. D. Clark, F. J. Rutledge, Jansen Haines, R. R. Young, Mr. Scranton.

Cities Service Announces Extra Stock Dividend.

At the regular October meeting of the directors of Cities Service Co. it was decided to carry out the dividend policy outlined a year or so ago and increase the stock dividend on the common from 6 per cent. to 9 per cent. The new dividend will go into effect on February 1, 1918, and will apply to stockholders of record January 15. On that date the monthly dividend will be ¾ of 1 per cent. instead of ½ of 1 per cent. As contemplated in the dividend program outlined previously, the cash dividend on the common will remain unchanged at 6 per cent. The proposition of listing Cities Service stocks on the New York Stock Exchange and abolishing the par value of the common and exchanging ten shares of new stock for one share of the old, was not acted upon, as it was considered an inopportune time to consider any radical changes in the company's policies.

TEXAS ASSOCIATION.

Annual Convention at Dallas Heard Several Instructive Papers.

Fort Worth will entertain the 1918 convention of the Texas Gas Association, in September. Fifty-two members of the association met in Dallas October 16th and 17th for the first annual convention. The business transacted following the annual address of President M. T. Walker of Beaumont, was the passage of a resolution pledging support to President Woodrow Wilson in national affairs and Governor Will P. Hobby in state matters. All members were urged to purchase Liberty Bonds and every one expressed the determination of investing as heavily as possible in the second issue then on sale.

F. G. Storm, President.

The gas men of Texas are feeling the effects of the war. While the increase in the sale of gas has been about 10 per cent. and from 5 to 10 per cent. in gross earnings, the cost of materials and supplies, ranging from 50 to 100 per cent., has offset this, it is declared. The big weight of the increase in materials and supplies has necessarily rested on companies manufacturing gas; but the dealers in natural gas say that a good part of the weight has settled on their shoulders.

C. H. Seidenglanz, Secretary.

Several interesting papers were read at the first session. J. S. Connelly, president of the Atlanta Gas Co., presented the subject, "Laying of Gas Mains and Installing Distribution Systems for Natural and Artificial Gas;" "New Business" was the subject of the paper read by S. L. Barrows of the Beaumont Gas Co.; "Oxwelding in Gas Main Construction" was the theme on which M. S. Clark spoke; F. G. Kune's paper dealt with "Water Heaters as Business Getters." Discussion followed the reading of each paper. In the evening, a banquet, followed by a theatre party was held at the Adolphus Hotel, where the convention was in session.

The program for the meeting Oct. 17th included "The Conservation of Natural Gas," R. L. Underwood, manager Groesbeck Gas Co., and "Need for Higher Rates by Public Utilities," John Nickerson Jr., St. Louis.

The following new officers were elected: F. J. Storm, Amarillo, president; W. H. Clifford, Palestine, first vice-president; W. H. Sedberry, Marshall, second vice-president; C. H. Seidenglanz, Dallas, secretary. The new directors are P. E. Nicholls, Galveston; J. S. Connelly, Atlanta; A. T. Kneis, Austin; and C. B. McKinney, Denison.

W. I. Battin, who for several years has been located in Fort Wayne, Ind., in the capacity of chief engineer of the various properties comprising the southern division of the Northern Indiana Gas & Electric Co., including Bluffton, Decatur, Wabash, Peru, Logansport, Lebanon and Crawfordsville, has resigned to accept a position with the United Gas Improvement Co., of Philadelphia. Mr. Battin has been succeeded by J. C. Grey, who for several years has been with the Savannah Gas Co., Savannah, Ga. Mr. Grey will remove his family to Fort Wayne in a short time.

Ricardo Narganes, builder of the Havana (Cuba) gas works, died in New York, October 3.

Oscar H. Fogg, engineer of utilization of the New York Consolidated Gas Co., has been made captain in the Ordnance Department and expects to sail for France shortly.

NEW PRODUCTS

NEW WATER HEATER.

The American Water Heater Co. Announces Its Plans and Personnel.

The American Water Heater Co., St. Louis, is sending notice to the trade announcing the company's entrance into the general market, and setting forth the policies under which their heater will be sold. In this notice the company states that, while their heater was perfected some three years ago, they have deferred general marketing of it until it could be thoroughly tested out and the practicability of certain revolutionary theories of construction could be proved. They now represent that these tests have been completed and they are ready to place their heater on general sale.

The illustrations on this page show the company's plant and interior views of the general offices, executive offices, directors' room and demonstrating and sales room. The plant consists of two buildings, each 80x140 feet, the one in the rear being located next to the Terminal freight station and being used for crating, storage and shipping. Being thus located, no drayage is required, either in or out. The factory affords 30,000 feet of daylight floor space, is equipped with the latest automatic labor-saving machinery throughout and is one of the most nearly perfect of its kind in existence. Adjoining is a company-owned plot 100x150 feet for future factory expansion.

The American Water Heater Co. was organized in 1915, and is a Missouri corporation with $250,000 capital stock. The principal stockholders are prominent and successul business men, comprising men in the foundry and metal trades, some of them millionaires, and ample capital is available to develop the company to a leading position in the industry. The mechanical personnel includes men who have been identified with the industry since its beginning. Notable among these is W. Fraser Stewart, the designer of the American Heater, and the originator of more improvements in water heater construction than any other man in the trade, it is believed.

Executive Offices American Water Heater Co., St. Louis.

The American Heater, according to the company's literature, is assembled throughout. Rigid specifications are drawn for parts, largely furnished by stockholders, and these are purchased in enormous quantities on contract. Purchasing thus from some of the largest foundries and factories in the country, the company is enabled to procure their parts at minimum cost and to reduce the price of their heater accordingly.

The selling plans which the company announces are unique, in that they propose to sell to gas companies exclusively and at a price based on the lowest figure compatible with good business principles. Claiming that they will be able to dispense with an elaborate selling organization, they announce that it will be possible to fix prices at such low figures that sales by gas companies can be very materially increased. Asserting that the American Heater is as good as its name, that it embodies revolutionary improvements in construction which make for cheaper operation and upkeep and that its mechanism is simple and free from trouble they believe it will appeal to all gas men.

The company will have four district sales offices, these being located in the East, central West, South and far West. William J. Langenheim, well known in

Factory Building of American Water Heater Co. St. Louis.

the industry, will have the eastern territory with an office in Philadelphia, and Lee B. Mettler, also widely acquainted in the trade, will cover middle West territory with headquarters in St. Louis. Southern and far Western representatives will be announced within a short time.

Extra! Chas. Harbison Becomes "The Ossco Man."

Charley Harbison, the sage of Lancaster, hereafter is "The Ossco Man." He has already signed up with the Ohio State Stove Co. to purvey "Liberty Glow," "Kumfy" and other heating appliances to the commercial managers of the United States, Canada and Hawaii, in every gas company of which countries he is as much at home as he is in Lancaster, Ohio. That makes him pretty much at home in these places, for in Lancaster he is on familiar terms with even the leading

The New "Ossco" Man.

bankers and they call him "Harby." For ten years he has represented the Reznor Mfg. Co., and in that time built up for that company and himself a distinguishing name in gas circles. His original ideas for exploiting his appliances have been a feature of each succeeding season, while at the state and national association meetings he is alway one of the popular regulars. One of Mr. Harbison's best stunts is the distribution of fancy paper headgear at the convention banquets and it was on these occasions that he has been the author of considerable merriment for the guests. At one famous banquet in the middle West he inserted several specially designed hats in the lot to be distributed, and gave instructions to the distributors as to which guests should receive these ornaments. Thus it came about that a dignified but very bald gentleman drew a chicken which perched upon his head throughout the dinner, and a "peddler" noted for exaggeration about his orders, got a George Washington hat. Mr. Harbison is to be sales manager for the Ossco heating appliance department and it is a matter of gratification to his hundreds of friends throughout the industry that his new duties will keep him in personal touch with them, as heretofore. His new line of heating appliances are already well and favorably known to all gas companies, so that the combination which makes possible "The Ossco Man" should prove advantageous all around.

Makes Jitney and "Beaver" Die Stock Thread His Pipe.

That "necessity is the mother of invention" is amply proven by the accompanying illustration. C. Risager, a wide-awake, progressive plumber of Aberdeen, S. D., received the contract for a large plumbing and heating job several miles out in the country. The work had to be done in a hurry. Mr. Risager, not caring to go to the expense of moving a heavy stationary power machine (weighing a ton or so), secured a shaft having a universal joint at each end. One end of this shaft he fitted to the rear axle of his Ford truck, and the other end to the driving pinion of a No. 41 "Beaver" easy working die stock, threading pipe from 2½ to 4 inches. Mr. Risager states that this ingenious arrangement has proven absolutely satisfactory, and in the future he will never worry about threading a large amount of 4-inch pipe out on the job. The home-made arrangement did the work!

Calorgraph Placed on Market By Precision Instrument Co.

The "Precision" patent Calorgraph is said to be another of the scientific achievements that have been won by American instrument makers since the war stopped importation. This continuous recording calorimeter is the work of the Precision Instrument Co., of Detroit, which claims that it is the only instrument of its kind that is at once accurate, simple and durable and in which the records automatically are corrected and compensated in terms of gas measured at normal temperature pressure. This Calorgraph records the calorific power of any gas in gross or net heat units. It is made with three types of chart, one with a continuous roll lasting for 60 days, another with a circular chart lasting for 24 hours and one with a drum chart lasting for 24 hours.

New Ingersoll-Rand Publications Ready for Distribution.

Compressors and vacuum pumps for extraction of gasoline from natural gas are featured in a new bulletin 3118 issued by the Ingersoll-Rand Co., 11 Broadway, New York. In addition to details concerning this equipment, valuable information is presented concerning the process of extracting gasoline.

If you wish to increase the capacity of your steam plant or reduce its operating cost, bulletin 9024 will interest you. It describes steam condensing

The "Precision" Calorgraph

plants consisting of Beyer barometric counter-current condensers, Ingersoll-Rand dry air pumps and Cameron water pumps. This bulletin illustrates several typical condenser plants installed for various classes of service and describes in detail the many construction features.

Copies of these new bulletins may be obtained from the manufacturer upon request.

Utilizing "Lizzie" to Thread Pipe with "Beaver" Die Stock.

A NEW HEATER.

"Detroit" Hot Water Appliance Promises To Meet a Real Need.

The nifty little hot-water house heater announced elsewhere in this issue by the Detroit Heater Corporation, Detroit, Mich., promises to supply gas companies with a highly useful appliance that can be installed with economy in homes already equipped with steam or hot water boilers. As an auxiliary heating unit its mission is clearly defined and no doubt it will be generally welcomed throughout the country.

Where a home already has hot water or steam heat, a Detroit for a small house, says the manufacturer, keeps it comfortable in winter, especially in the chilly evenings of May or June, September or October, when the house needs just a little heat to make it cozy. In the districts of cheap artificial gas (Baltimore, 35 cents a thousand; St. Louis, 50 cents a thousand; Chicago has just put into effect a scale of 40 cents a thousand in large quantities) house heating by gas is the rule, as it long has been in the natural gas fields.

The Detroit Heater.

The Detroit heater may be attached to the present hot water or steam system without disturbing in any way the coal boiler. And it stands by ready for use, if needed. Coal may run out, or a furnace grate break, or the boss fail to return home in time, or coal boiler fails to warm house on that extra cold day—all the wife has to do is strike a match and the house is warm.

The heaters are useful in greenhouses, garages, sprinkler system tanks on roofs, small stores, individual apartments, lofts and incubators.

These heaters come in various sizes. Each is a one-piece hollow chambered steel shell. The heater sections are welded in all their parts together, making it a one-piece article. The autogenous acetylene process making all sections in effect one piece and actually stronger at the welded joints. No rivets, bolts or solder enter its make-up. It is estimated to stand 500-1,000 pounds pressure, and with little care lasts many years. The circulating water, running in thin ribbon-like sheets, whirls furiously, and an exceedingly high temperature is thus imparted by the very large super-heating surfaces. Kieselguhr heat insulating material is used on the house heating models to prevent any heat waste. Combustion of the gas attains a very high temperature. The hot gases rising give up their maximum heat to the generating units. Nearly all heat is absorbed by the water.

Foreign Trade Opportunities for American Manufacturers.

Parties interested in the following foreign trade opportunities, can obtain addresses and full information of the Bureau of Foreign and Domestic Commerce, Washington, D. C.:

No. 25384—A gas company in Italy wishes to purchase gas coal for a plant of 1,000 tons daily capacity.

No. 25396—An Italian gas company is in the market for large quantities of gas pipe. Correspondence in English.

No. 25388—A company in Italy wishes to buy gas coal in 4,000 to 5,000 ton lots.

No. 25438—A commission merchant in Spain desires an agency for the sale of gas fittings and supplies such as lamp shades, etc.

No. 25473—An agency is desired by a man in Spain for the sale of machinery and apparatus for the manufacture of gas. Correspondence in Spanish.

No. 25736—A firm in Italy is in the market for unclosed iron tubes for gas, etc., in various sizes and in large quantities. Correspondence may be in French or Italian, preferably the latter.

Popular Features Claimed by the Cabco Gas Radiator.

The Cabco gas radiator is earning the approval of the gas field judging from the repeat orders reported by its makers, the Chas. A. Baxter Co., of Pittsburgh, Pa. This radiator has a number of features that are responsible for its popularity, say the manufacturers. All sections are made the same length, there are no valves to adjust and it has a full length bunsen burner to give it good heating ability. There is no sheet metal used in the construction of this radiator and for this reason purchasers are assured that it will stand up under the hard service of many cold spells. The control of this heater is entirely automatic and is said to be very dependable. The Baxter Co. is planning to increase its efforts for gas company business on the foundation laid by the heaters now in service under observation of gas company engineers and new-business men.

The Toledo branch of the Pittsburg Water Heater Co., has moved to new quarters on the ground floor at 703 Jefferson avenue, where a full line of "Pittsburg" heaters are carried. W. H. Wallace, district sales manager, reports a beautiful display room and considerable additional business.

New "Champion" No. 90 Is Two Ranges In One.

The new No. 90 "Champion" combination gas and coal range is two complete ranges in one, its makers explain. A table range with interchangeable gas or coal and wood fire box, it can be changed in 3 seconds. It cooks, bakes and roasts with gas, coal or wood, and is a complete range for two fuels at the same time, or separately. It has white enamel splashers, oven door panels, drip and broiler pan. All castings except cooking top ebony finish.

The coal compartment has fire brick lining, duplex grate, damper regulating draft and two 8-inch cooking lids. The gas cooking top has four removable burners, two giant and two medium.

This is practically the same range as the No. 55 the company has been advertising in the past, with the exception that it has no swing burners on it. The gas burners to the coal firepot connect from the manifold on the front, and what was the small warming oven on the No. 55 (under cooking top) has been converted into a coal baking oven. This gives an indirect heat going down through a cast box in the bottom of this oven, which makes it hold the heat a longer time.

New "Champion," No. 90.

It is being handled exclusively by the Peoples Gas Lt. & Coke Co., Chicago.

"Quality Service" Features the New Gas Toaster.

The Roberts & Mander house organ, "Quality Service", has a very interesting description, with cuts, of the new hotel bread toaster in the current issue. This appliance has already proved highly popular with gas companies and is destined, it would seem, for a permanent place in the industry. It is designed for hotels, restaurants, clubs and hospitals. The bulletin also describes the other "Quality" hotel kitchen appliances and the line looks as though it were fully capable of sustaining its name.

Price Increase by Improved Appliance Co.

An increase in prices is announced by the Improved Appliance Co., 445 Kent avenue, Brooklyn, the new list being published in bulletin 15, which supersedes bulletin 14.

Governor for Maintaining Constant Steam Pressure.

For steam boilers using natural or artificial gas for fuel, the Fulton gas-fuel boiler governor is said to offer many advantages. The manufacturer states that it will maintain any desired steam pressure constant and unvarying from one pound to 150 pounds or more, without attention from the engineer, no matter how frequently nor how greatly the demands for steam may vary. The valves are so constructed that they are frictionless and cannot stick and do not obstruct the flow of gas, it is pointed out. The seam pressure can be instantly increased or diminished by simply changing the position of the weight on the lever. Further information concerning this device may be obtained from the Chaplin-Fulton Mfg. Co., 28-34 Penn avenue, Pittsburgh.

New Ideas Advanced By Codd Tank Co.

The Codd Tank & Specialty Co., Baltimore, has recently designed a boiler grate (patented) for marine and stationary purposes, says the "Modern City," in a recent article. This grate admits more oxygen into the furnace by increasing the draft, burns the coal to almost perfection, no wasting gases into the stack. This grate meets the objectionable high-priced coal and reduces expenses these war times. This company has also recently applied for a patent for a double-seated pipe union. This is a double protection against leakage, and will be appreciated by all engineers, plumbers, pipe fitters, etc.

A money-saving material is being manufactured by the company, for preserving the life of all fire bricks, matters not how high the heat or how strenuous the conditions. It is called "Inferno Fire Brick Cement," and it welds the fire bricks together, making an impregnable joint through which the fire and injurious gases cannot penetrate and eat the bricks.

Western Gas Construction Co. Reorganized.

The Western Gas Construction Co. has been reorganized and additional capital secured which will place the company in a strong position, enabling it to give prompt attention to orders for standard apparatus and equipment as manufactured in the past, and as well as to accept orders for new work. The plant includes the pattern shop, machine shop, foundry, forge and tank shops, located at Fort Wayne, Ind. O. B. Young has been made manager and William C. Marquardt assistant treasurer. O. N. Guldlin, on account of ill health, will retire from the active management of the business but will be retained in a consulting capacity. Thos. W. Stone will continue with the company as chief engineer.

Sand Blast Machines Subject of a New Catalogue.

The sand-blast machines of the Hoevel Mfg. Co., New York, is illustrated and described in a new 20-page catalogue. Among the simpler machines built by this company are a hose sand-blast, suitable for cleaning the exterior of gas holders, and a machine with a stationary nozzle.

Gwynn Engineering Co. Broadens Its Scope.

Gas men and others familiar with the name of The Gwynn Gas Burner & Engineering Co. will recognize this well known concern by the new name, The Gwynn Engineering Co. The new name was selected for several reasons, among them being simplicity and at the same time more latitude as regards the new enterprises the company is launching from time to time and adding to the parent trunk, which up until two years ago consisted solely of the sale of Gwynn gas burners.

About two years ago a new factory was equipped with up-to-date machinery and jigs for manufacturing Gwynn gas burners of the various sizes in quantities and all made to exact measurements. Several reasons brought about the decision to manufacture the Gwynn gas burners in the company's shop, chiefly among them being that the local shops were unable to fill sales requirements of the Gwynn company, due to the widespread and steady demand for this reliable, efficient and well known gas burner. Another reason was that closer supervision and knowledge of what material was going into the product was afforded by having a factory of their own.

The venture, if it could be termed such, under the conditions of having a growing and rapidly increasing sales proposition, proved a success. Not content with this proof of managing ability the Gwynn company advertised in a small way for machine work within their capacity on small engines, motors, valves and general work pertaining to gas appliances. The success of this latter move proving of benefit, the company is preparing to install additional machinery to take care of its foreign manufacturing business, which apparently holds promises of great remuneration. The extensive experience of the Gwynn company in the gas burning business places it in splendid position to advise in regard to design and manufacture of gas and oil burning appliances.

Pilot That Will Not Blow Out Makes Good.

The "C-C" lighter recently perfected and released to gas companies by the Welsbach Co. has been still further developed and can now be used on all Welsbach kinetic gas bowls, C E-Z lights, outdoor lamps and commercial indoor lamps. There is no doubt the development of this lighter has done more to insure gas lighting than any other improvement in recent years. The elimination of pilot outage is a Godsend to the maintenance departments of gas companies.

The Welsbach Residence Unit and "C-C" Lighter.

A Handsome Welsbach Residence Lighting Unit.

Another new Welsbach unit is announced from the Gloucester factory. It is the residence semi-indirect bowl No. 1666, as illustrated in the Welsbach company's 1917 gas company supplement; Adam design, and shown with bowl No. 1206, "Windolite." This is, indeed, one of the handsomest fixtures in the Welsbach 1917 line and should be very popular with gas companies for use in residence lighting.

Royal Enameling Co. Adding To Its Plant at Chicago.

The Royal Enameling Co., 316 West Madison street, Chicago, is building a machine shop 76x100 feet at Des Plaines to cost $18,000.

Davis-Bournonville Co. Buys Elkhart Plant.

The Davis-Bournonville Co., with general offices and factory at Jersey City, has taken over the plant and factory of the Davis Acetylene Co. at Elkhart, Ind. The Davis Acetylene Co. has been dissolved and the manufacture of acetylene lighting generators and accessories discontinued. The plant will hereafter be operated under management from Jersey City for the manufacture of acetylene pressure generators for the oxy-acetylene process, and for special products. The Canadian factory at Niagara Falls, Ontario, which has been jointly occupied by the two companies, has also been taken over, and will be operated exclusively for the manufacture of oxy-acetylene apparatus for the Canadian trade. The Davis-Bournonville Co. has also purchased the H. G. Kotten Co. factory and grounds opposite its Jersey City property. This gives the purchaser half of the city block running through from Van Wagenen to Corbin avenues, and half of the block from Corbin to West Side avenues. The Kotten factory will be used for manufacturing electrolytic oxygen apparatus and accessories, releasing considerable space in the company's new factory building for increased output of oxy-acetylene welding and cutting apparatus. A four-story warehouse, 60x100 feet, of brick and mill construction, will be immediately erected on the Kotten property, still leaving ground for a five-story factory, 60x150 feet, corresponding to the company's No. 3 factory, recently completed, which may be erected the coming year.

Ruud Bulletin Emphasizes Quality Theme.

The Ruud Mfg. Co., of Pittsburgh, is making its bulletin service to gas companies more and more attractive and effective. The latest, "Your Pledge to the Public," is one of the finest and most convincing arguments of the month. It takes for its text the "quality" theme in business, and applies it forcibly to the gas company and its relation to the public. "The man who buys an automatic water heater today buys it because you convince him it is a good thing to have. His faith is in your recommendation . . . . . There is a direct obligation on your part to live up to this confidence which the public has in you," is one of the ideas impressed on the gas man by this admirable bit of literature.

25 "Pittsburg" Heaters Sold in Lake Charles.

The Lake Charles (La.) Gas Co. has just concluded a very successful and satisfactory campaign on "Pittsburgh" water heaters. During the campaign they sold twenty-five automatics, and after salesmen's notes were compared they had prospects enough to keep their force busy for a month. P. O. Moss, secretary, states that the success of this campaign is due in a great measure to the assistance given by the "Pittsburgh" water heater sales promotion department service. This is another incident proving that more gas appliances can be sold if the gas company works hand in hand with the manufacturer.

The Perfo Radiating Plate Comes To Stay.

Every now and then some little useful and really meritorious household article stands out above the average and makes itself an actual necessity in the modern home. The Perfo Radiating plate is just one of these little articles. We understand this device cannot be called exactly new to the public, as it was placed on the market a few years ago when its sales were so large as to cause much litigation; yet, it can be safely said that it is now on the market for good.

The Perfo Radiating plate is so constructed as to maintain a "dead air" space between the bottom of the pan in which food is being cooked or pastry baked, and the heat. The arrangement of these little holes, or perforations, in the top and bottom are such as to permit the heat to pass through and yet prevent the scorching or burning of the article being cooked or baked. It permits articles of food to be cooked or warmed over a gas flame without the remotest chance of burning. It also prolongs the life of cooking utensils, as it evenly distributes the heat over the bottom of the cooking pan, causing the liquids to boil evenly throughout instead of being burned by a concentrated flame, the intense heat of which reaches the pan in one spot. In addition to this, and for the same reasons, it prevents liquids from boiling over.

In connection with the Perfo Radiating plate comes a Perfo oven cover and a wire rack. The complete set of three pieces can be sold by mail for less than a dollar retail. This oven cover really forms a small oven for the top of a gas stove that is very convenient for doing limited baking without that constant attention and fear of burning or scorching.

The satisfaction of knowing that the contents of the cooking utensils cannot scorch, that less fuel is required in cooking or baking is so apparent that the good housewives will undoubtedly give a ready welcome to these efficient little household aids.

Youngstown Sheet & Tube Co. Opens Washington Branch.

In addition to its district sales offices now located at New York, Boston, Philadelphia, Pittsburgh, Chicago, St. Louis, Denver, San Francisco, Seattle, Dallas, Atlanta, and Detroit, The Youngstown Sheet & Tube Co. has opened a branch in the Munsey building, Washington, D. C. This office will be in charge of W. B. Blowers, district sales agent, assisted by H. E. Richardson, who has been transferred from the Philadelphia office, and who will reside in Washington.

Recent Installations of the Beals Gas Apparatus.

J. F. Beals, who recently installed the Beals Gas System in Panama and Colon has returned to take charge of the new plant of the Winslow (Ariz.) Gas, Light & Heat Co. The Winslow company already has 170 meters in use and is growing rapidly as it is located in a prosperous community with a fine outlook for growth. Mr. Beals goes to Globe, Ariz., soon to install a set of Beals gas generators and scrubbers.

Wilputte Gets Big Contract From Canadian Steel Co.

The Wilputte Coke Oven Corporation, of New York City, has been awarded the contract for 80 Wilputte ovens with by-product plant coal and coke handling equipment and all accessories by the Steel Co. of Canada.

Mueller Mfg. Co. To Enlarge Port Huron (Mich.) Plant.

The Mueller Mfg. Co., of Decatur, Ill., will build an additional plant at Port Huron, Mich., including a brass foundry 86x140 feet, a rod mill 80x100 feet and a power house, at an aggregate cost of $400,000.

W. N. Best Heads a New Smoke Consuming Company.

The W. N. Best Smoke Consuming Co. has been chartered with $50,000 capital to make smoke eliminators by E. S. Hammond, A. H. and W. N. Best, 383 Gates avenue, Brooklyn.

Additional Capacity Contemplated by U. S. Cast Iron Pipe Co.

The United States Cast Iron Pipe & Foundry Co., Burlington, N. J., contemplates building an addition.

Industrial Furnaces Ready for Immediate Delivery.

The Gilbert & Barker Mfg. Co., Springfield, Mass., has recently completed the construction of approximately one hundred industrial gas furnaces of a type that is in constant demand by the gas companies of this country. This is a very fortunate circumstance for the industry, in view of the great dearth of material now prevailing among the gas furnace manufacturers, and it affords the Gilbert & Barker Co., a splendid opportunity to show real service to their customers. Oven furnaces for the treatment of metals and for all kinds of baking under high temperatures are just now badly needed in the industries, and there are numbers of gas companies in various sections of the country seeking a supply of these appliances.

The Gilbert & Barker furnaces have always stood the standard tests and have been highly popular among the industrial gas men on account of their economy of operation and their efficiency. No doubt the company's foresight in landing enough raw material to manufacture and supply this lot for the industry will be duly appreciated. The company will be glad to send detailed information of each type of furnace on request.

Davis-Bournonville Opens Office at Washington, D. C.

The Davis-Bournonville Co., Jersey City, has recently opened a government sales office in the Colorado building Washington, D. C., with Henry R. Swartley, Jr., resident manager. The company manufactures oxy-acetylene welding and cutting apparatus and oxygen and hydrogen producing apparatus, which is being used extensively by both army and navy.

CONSTRUCTION NEWS

Binghamton Gas Co. May Extend Service To New York Towns.

The Binghamton (N. Y.) Gas Works has been authorized to extend its mains to Port Dickinson and furnish service to residents of that village. Under a franchise from the Town of Fenton the petitioner may also extend its service into that community but not until it has changed its certificate of incorporation according to the provisions of the Transportation Corporations Law.

New Plant at Anderson, Ind. Ready Dec. 1st.

Manager R. A. Zeigler of the Central Indiana Gas Co., says the artificial plant being rebuilt by the company probably would be ready for operation before Dec. 1. He states that the company had hoped to have the artificial plant in operation Nov. 1, but that the delay in the arrival of materials prevented the completion of the work. A new eighty-five foot cement stack is just being completed at the plant and three new boilers of 150 horse power capacity are being installed.

$50,000 Improvements at Richmond, Va., Plant.

Bids for improvement of the Richmond (Va.) gas works, which will cost approximately $50,000, have been asked by the administrative board, and will be received in the next few days. The board plans to make general repairs to the ten retorts used in the manufacture of coal gas, which will double the present capacity of the plant.

Worden-Allen Get Contract for Improvements at Milwaukee.

The Worden-Allen Co., (Lackawanna Bridge Co.), has been awarded the contract for alterations and improvements to the boiler house of the Milwaukee Gas Light Co.'s main works on Jefferson street. The work involves new trusses, columns and other structural changes, costing $15,000.

Hibbing (Minn.) Will Install Coal Gas Plant.

Hibbing, Minnesota, through its consulting engineers, Walker & Cressler, represented by George Cressler, of Chicago, have purchased of the American Gas Construction Co., of Newton, Iowa, a complete coal gas plant and distribution system, work on which is to start immediately.

Manila (P. I.) Gas Plant To Be Enlarged.

The Manila (P. I.) Gas Corp. has arranged for extension of its service.

Sioux City (Ia.) Gas & Electric Improvements.

Sioux City (Ia.) Gas & Electric Co. has taken out building permit to construct a $25,000 addition to its plant.

THROUGH SOLID ROCK.

Doherty Men Lay 28 Miles of 16-In. Gas Main Near Bartlesville, Okla.

Commenting upon conditions in Bartlesville, Okla., Milan R. Bump, chief engineer for the H. L. Doherty syndicate says: "The amount of work being done in Bartlesville is simply appalling, and great credit is due the Doherty men in that city for the big things they have accomplished, despite such handicaps as limited supplies of labor and materials. The biggest thing that is being done down there is the laying of a 16-inch gas main through 28 miles of solid rock. In order to get this work completed as soon as possible, three shifts of eight hours each are doing the work. In fact temporary electric illumination is being provided so that the work may go on without interruption. As a result, the construction gangs are making the phenomenal record of opening almost a mile of ditch a day. Despite the speed that is being made, the work will not be completed until December 1 and will thus be unable to handle the extra demands for gas whic will come with the first cold weather.

Gas Now Available for Citizens of Hilo, Hawaii.

In the presence of a distinguished gathering of local citizens the Hilo (Hawaii) Gas Co. made available the first supply of gas in that city on Oct. 1st. To Judge Clem K. Quinn was given the honor of loosening the big valve which turned on the fluid, and as he performed the operation those present cheered the undertaking to success. Engineer Berkley, under whose supervision the plant had been erected, explained in detail, the manufacture of gas and for the benefit of not only those present, but for those also who were unavoidably absent made the following statement:

"Our machinery today is not only absolutely complete in every possible detail, but we have arranged just as complete an auxiliary which will enable us to continue our service in case the operating machinery gets put out of commission. Not only this, the present capacity is a quarter of a million cubic feet of gas per day and this can be doubled with the machinery on hand. To forestall any fear that some may entertain in case clouds of smoke should be seen issuing from the smoke stack on occasions, I want to say that there is absolutely nothing to alarm anyone from this fact."

Pennsylvania Gas Co. Adds To Facilities at Warren, Pa.

The Pennsylvania Gas Co. is building a shop at Warren, Pa., to be used for pipe fitting work and various kinds of repair work.

New Buildings To Be Erected by Providence Gas Co.

The Providence (R. I.) Gas Co. has let contracts for a brick and steel, 32x144-foot, a 30x40-foot, a 31x31-foot and a 31x44-foot addition to its machine shop at Sassafras Point.

The Goldsboro Gas & Fuel Co. (N. C.) is installing a new 4-ft. water gas machine and building an addition to its generating house.

The Isbell-Porter Co., Newark, N. J., is enlarging the capacity of the Brocton (Mass.) Gas Light Co.'s plant with silica retorts, remodelled secondary air supplies and other changes. The work will be completed about January 1st.

J. E. Sahlin, formerly with the Iowa Gas Co. at Iowa Falls, Ia., now is with the Ironwood (Mich.) Gas Co. and a material improvement in that property may be expected.

Alan E. Lockwood has resigned his position as superintendent of the Bluefield (W. Va.) Gas & Power Co. to enter the service of the government as lieutenant in the aviation corps.

Alva Woodward, formerly at Bluffton, Ind., now is engineer for the Michigan Light Co. at Jackson, Mich.

Archer Bishop is the new secretary of the Knoxville (Tenn.) Gas Co. succeeding B. A. Smith, transferred to Spokane (Wash.) Gas & Fuel Co. Mr. Bishop formerly was with the Bristol (Tenn.) Gas & Electric Co.

C. D. Roberts now is commercial manager for the Blackstone Valley Gas & Electric Co. at Woonsocket R. I., vice F. H. Venn, who goes with the United States Rubber Co. at New Haven, Conn.

Charles Otten, Jr. formerly superintendent of the Haverhill (Mass.) Gas Light Co., and Clarence Lewis, who held a similar position with the Pawtucket (R. I.) Gas Co., have exchanged places. Both properties are under Stone & Webster management.

J. C. Gilmour has been made chief clerk of the Consolidated Light & Power Co., Kewanee, Ill., succeeding Geo. Buck, who has been promoted to the auditing department of the American Gas Co. at Philadelphia.

ABOUT MEN YOU KNOW

St. John Returns to Madison As Head of Utility.

Frank L. Cross, since 1910 vice-president and general manager of the Madison (Wis.) Gas & Electric Co., has moved to St. Paul, Minn., to accept the position of vice-president and general manager of the St. Paul Gas & Electric Co.

John St. John, formerly secretary-treasurer of the Madison company, who went to St. Paul, October 1, to assume the position of assistant manager of the company in that city, will return to Madison November 1 and take charge of the office to be vacated by Mr. Cross.

These changes are promotions for Mr. Cross and Mr. St. John. Mr. Cross went to Madison from Detroit where he was connected with the Detroit City Gas Co. which also controls the Madison Gas & Electric Co. and the St. Paul Gas & Electric Co.

Since Mr. St. John went to St. Paul, Paul Doty resigned as vice-president and general manager of that concern. Mr. St. John holds the position of assistant manager.

Robert S. Miller, for 12 years manager of the Jackson County Light, Heat & Power Co., at Independence, Mo., has accepted the management of the Marion (Ind.) division of the Central Indiana Gas Co. Marion has been using natural gas and the supply becoming inadequate, the company is building a new plant for the manufacture of gas for the division and to this work Mr. Miller is called. D. S. Mile, formerly of Marion, goes to Independence as manager.

Chester N. Chubb, for the past two years in charge of the South Bend (Ind.) plant of the Northern Indiana Gas & Electric Co., has left for Davenport, Ia., where he is to take the position of general manager with the Tri-City Railway & Light Co., which serves the cities of Davenport and Moline and Rock Island, Ill., with light, heat and railway facilities.

C. W. Wardell recently beat out F. N. Hammerstrom for the annual Welsbach golf trophy by the narrow margin of one game. This year's award was a silver plate presented by Townsend Stites, general manager of the company. All games in the tournament were played at the Woodbury (N. J.) course, said to be the only gas-lighted golf course in the country.

MERCHANT TRANSFERRED

Bloomington (Ill.) Manager Goes To New Orleans as General Superintendent.

A. E. Merchant recently resigned his position as general manager of the Union Gas & Electric Co. at Bloomington, Ill., to become general superintendent of the

A. E. Merchant, New Orleans.

New Orleans (La.) Gas Light Co. Mr. Merchant's experience in the gas business covers a period of 14 years. He was born in England and educated in Queens college. He started his career as a gas man in the Philadelphia Gas Works. He was later superintendent and then general manager of the Altoona (Pa.) Gas & Fuel Co. He gave up the latter position to become general manager of the Bloomington company. In his new capacity as general superintendent of the New Orleans company Mr. Merchant will have under his supervision the manufacturing, distributing, jobbing and commercial departments.

C. H. Quackenbush, general manager of the St. Clair County Gas & Electric Co., East St. Louis, Ill., was in Chicago, October 22, on business.

H. J. Waterbury has resigned as manager of the Marquette (Mich.) Gas Light Co.

L. E. Caldwell, general manager and engineer of the Iowa City (Ia.) Gas & Electric Co., was in Chicago recently visiting friends and transacting business.

James F. Meagher, of Chicago, Is Dead.

The death of J. F. Meagher, ex-president of the Peoples Gas Light & Coke Co., Chicago, occurred October 30th at Greenwich, Conn. where he had been spending the summer in an effort to regain his health. Two years ago he suffered a stroke of paralysis. Mr. Meagher was connected with the Peoples company for many years, his legal life work having been as attorney for that organization. His chief service was in his successful defense of the quo warranto proceedings brought by State's Attorney Deneen to test the act under which the gas companies of Chicago were consolidated.

Mr. Meagher served successfully as vice-president, director and president of the gas company, resigning the latter office on July 14, 1915. As attorney for the company, Mr. Meagher was a picturesque and aggressive figure well recalled by the Chicago bar. His hobby was courtroom battles, his old friends say. He never mingled in politics.

A. B. Winne, who for several years has been connected with the Mansfield, O., plant of the Doherty company, has assumed the management of the Fremont (Neb.) Gas, Electric Light & Power Co., succeeding H. C. Feuers, who goes to Sedalia, Mo.

R. B. MacDonald has been made general manager of the Peoples Power Co., at Rock Island, Ill. Formerly, Mr. Mac Donald was superintendent and later general manager of the Fort Dodge (Ia.) Gas & Electric Co.

E. H. Davis, of Houston, has been appointed manager of the Texas Gas & Electric Co., at Center, Tex., vice E. A. Davidson, resigned.

W. J. Swarting has been appointed superintendent of the Peoples Gas & Electric Co., at Mason City, Ia. He formerly was engineer on construction and operating work of the power house and gas works of the Peoples Power Co.

C. K. Nichols, formerly commercial manager of the Union Gas & Electric Co., at Bloomington, Ill., now is general manager for the gas company at Bluefields, W. Va.

A. J. Jackson is the new commercial manager at Wilkesbarre, Pa.

GRIBBEL A CAPTAIN.

Prominent Association Figure Commissioned in Gas and Flame Regiment.

The organization of the 30th Regiment of Engineers, U. S. A., known as the Gas and Flame Regiment, has awakened a lively interest among gas men throughout the country and many prominent members of the gas fraternity have offered their services to this branch of war activities and have been accepted. The latest addition to the list is W. Griffin Gribbel, of Philadelphia, who has been commissioned a captain in this regiment and will leave immediately for service abroad. Mr. Gribbel is one of the best known men of the industry, his active work as a member of important committees of both the American Gas Institute and the National Commercial Gas Association having

Capt. W. Griffin Gribbel.

brought him in contact with practically every interest connected with the industry. His friends in all parts of the country will eagerly await the news of his progress in the highly essential work he has undertaken, for he is eminently qualified in every particular to carry on this branch of the service.

The 30th Engineers will have charge of the production, manipulation, transportation and application of poison gas and liquid hydrocarbons, which will be used primarily to create a smoke screen behind which the first wave of infantry attack will advance. It has not yet been decided whether the gas and liquid will be produced on this side temporarily and shipped over in caissons, or whether the general staff will not try to initiate and develop these combative means on this side, but will profit by the experiences of the allies on the western front and use the means they have developed over there.

The enlistment of the non-commissioned officers and privates of this battalion is now taking place in all the larger cities. As it is a work that requires some familiarity with mechanical apparatus and gas, and is rather hazardous, the enlistment is going rather slowly and those taken are limited to men who have a physique above the average, with the experience above referred to. The recruiting officers are promising the men who enlist that the unit will be in France by Thanksgiving Day. Unofficial advices are that immediately the commissioned personnel is secured they will be hustled aboard to await the completion of the enlistment and non-commissioned portion of the battalion.

William A. Battey, associated for many years with the Shepard Electric Crane & Hoist Co. as eastern sales manager and sales director, will sever active connection with the company on Dec. 1. He will retain his interest in the company, however, and continue as a director. Mr. Battey will start in December to devote his entire attention to the Pennsylvania Crusher Co., Stephen Girard Building, Philadelphia, of which he is vice president. The Pennsylvania Crusher Company manufactures hammer pulverizers, Bradford Breakers and other special crushing machinery for by-product coke plants; cement plants, etc. W. C. Briggs, who for the past 10 years has been associated with the Shepard Company's New York office as sales engineer, will become district manager. Robert T. Turner joined the New York organization on Nov. 1 as sales engineer.

Charles M. Eyman, for the past two years general manager of the Utah Gas & Coke Co. at Salt Lake, has resigned his position, to take effect November 1. Mr. Eyman will take up other interests in southern California. Before leaving Salt Lake City, at a general meeting of all employes of the company, he was presented with several handsome gifts as tokens of the esteem in which he was held by all those associated with him.

Among those who have offered their services to the new Gas and Flame regiment of the U. S. army are: A. S. Butterworth, of the Citizens' Gas & Electric Co., Waterloo, Ia.; W. L. Woodward, secretary-treasurer of the Santa Anna (Tex.) Gas Co., and E. C. Weisgerber, of the Equitable Meter Co., Pittsburgh, Pa.

W. A. Snyder, paymaster for the Peoples Gas Light & Coke Co., Chicago, has resigned to engage in business for himself.

Doherty Appoints New Managers for Sedalia and Fremont.

Transfers affecting three Doherty properties are announced, due to the transfer of S. B. Irelan from Sedalia, Mo., to Montgomery, Ala. Mr. Irelan's place at the City Light & Traction Co., Sedalia, is taken by H. D. Feuers, formerly general manager of the Fremont (Neb.) Gas, Electric Light & Power Co. A. B. Wynne, superintendent of the Mansfield (O.) Electric Light & Power Co., goes to Fremont as general manager. Harry D. Frueauff, vice-president and general manager of the Montgomery Light & Water Power Co., has been promoted to the post of assistant to the president of the Empire Gas & Fuel Co. of New York.

Carroll Collins, Jr., has resigned his position with the Pontiac (Mich.) Gas

Carrol Collins, Jr., Now In Navy.

Co. to enlist in the United States navy. He is a son of President Carroll Collins of the Marshall (Mich.) Gas Co., and is well known in the gas fraternity. His brother is E. H. Collins, manager of the Greenville (Miss.) Gas Co.

B. D. Harriman, for the past two years commercial manager for the Connecticut Light and Power Co. at Norfolk, Conn., has resigned his position to take charge of the plant of the Goldsboro Gas & Fuel Co., Goldsboro, N. C. Mr. Harriman leaves a most successful record behind him in Norwalk.

E. P. Coveny of the Minneapolis Gas Light Co. has been elected president of the Retail Credit Association of Minneapolis.

GAS LITERATURE AT A GLANCE

Conducted by R. S. McBride and C. E. Reinicker, Bureau of Standards, Washington, D. C.

Determination of Free Carbon in Tar.

By Pietro Falciola. Annali Chimica Applicata 7, 152-7 (1917), via Chemical Abstracts.—The method is based upon the use of fatty oils as solvents in place of xylene, toluene, etc. It is as follows: Allow 5 g. tar to fall little by little into 125-150 cc. olive oil that may be previously warmed to 140-160° in a porcelain or enameled iron dish. Bring to 180-190°, then with the thermometer suspended in the liquid allow to cool to 150° and filter (preferably with a hot air funnel) upon a double filter. Take up the carbon deposit on the bottom of the dish with additional 50-75 cc. oil, heat again to 180-190° and refilter. Take up again the residual carbon with carbon-tetrachloride, chloroform, alcohol or carbon bisulphide, pour upon the filter and wash completely; dry and weigh. Carbon tetrachloride has the advantage of non-inflammability, and after chloroform and carbon bisulphide, is the best solvent for oil. With large folded filters the operation is rapid. The filtering oil does not carry carbon along with it, nor does the carbon remain attached to the walls of the dish. Two determinations may be carried out in less than three hours' time upon tar not water-free. The official methods require water-free tar. Tars containing 25 per cent. or more water should be carefully added to the oil to avoid spattering. Determinations upon samples of tar containing from one to 20 per cent. water gave results within 0.6 per cent. and less of those obtained by official methods. A table is given showing solys. of naphthalene and anthracene in a large number of solvents, including hydrocarbons, ethers, esters, alcohols, and oils.

The Analysis of Light Oils.

By G. Egloff. Metallurgical and Chemical Engineering, 16, 259-63 (1917), via Chemical Abstracts.—The distillation outfit consists of a copper flask holding 4,000 cc., a column eight feet in height, a 24-inch glass condenser, and a receiver. The column is made up of six one-ft. sections of ¾-in. pipe, another section of 1.5 ft. in length, and a short section 6 in. long of 1.5-in. pipe. The 1.5-ft. section is at the top of the column, the 6-in. section at the bottom. A 30-mesh iron gauze between adjoining sections serves to support an 8-in. column of 2-in. glass rods. A reflux pipe, ¼ in. in diameter, taps into each section, and extends to within 1 in. of the bottom of the copper distilling flask. The connection between the flask and the column is made by a Dart union. 2,000 cc. of C_6H_6, C_7H_8, and C_8H_{10} were distilled. The rate of distillation was 4.5 hours. Methods for the determination of the olefins, aromatics, and paraffins in light oils resulting from the thermal decomposition of petroleum oils are given.

Truth About Synthetic Production of Benzene and Toluene by Cracking of Petroleum Oils.

By A. Bender. Oil, Paint and Drug Reporter 91, No. 20, 48H (1917).—Bender contends that synthetic aromatics cannot be economically recovered from cracked petroleum products.

Aromatic Hydrocarbons from the Thermal Decomposition of Natural Gas Condensate.

By J. E. Zanetti and G. Egloff. Journal of Industrial and Engineering Chemistry, 9, 474-8 (1917).—A natural gas condensate from W. Virginia was passed through an electrically heated cracking tube. The tar was collected by means of a Cottrell precipitator. The thermal decomposition was shown to produce benzene, toluene, naphthalene, acenaphthalene, anthracene, phenanthrene, pyrene, and chrysene.

Concentrated Gas Liquor, Pyrites Acid, and Tar Distillation.

By W. S. Curphey, "Gas Journal," 139, 265-6, 281 (Aug. 14).—A report by the chief inspector under the alkali works regulation act, which is a compilation of considerable technical interest to coal carbonizers and makers of sulphate ammonia or users of cognate processes. A greater part of the report is taken up with the direct process of sulphate of ammonia production, in continuation of the investigation started the previous year, which showed there were two problems that demanded research in connection with the process—the one being the relatively low make of sulphate realized per ton of coal and the other the effect upon gas purifier action when the process has been adopted. The effects of the war upon the ammonia industry are alluded to.—D.

Increasing the Internal Air Supply to Inverted Gas Flames.

By C. J. Alexander, "Gas Journal," 139, 325-6 (Aug. 21).—The writer claims to have devised a burner tube in which the air supply to the interior of the flame is increased without promoting firing back of the flame. The device is very simple, consisting of a hollow tee-shaped tube placed in the burner tube, its horizontal branches opening to the outer air and its vertical branch extending downward inside the burner tube and slightly below its lower extremity. The entraining action of the flame draws air through this tube and delivers it inside the inner cone of the flame. The partial obstruction in the mixing tube caused by this tee has the effect of preventing the interior of the stream of gas and air mixture being richer in gas than the outer part and thereby promotes more uniform mixture. With this device it is claimed that no adjustment other than at the burner cock is necessary and the maximum flame intensity is obtained at the mantle. No photometric tests have as yet been made to show the actual improvement of results as obtained by this device.—D.

Distillation of Oil in Vacuo.

By A. Pictet. Revue gèneral sciences, 27, 579-84 (1916), via Chemical Abstracts.—Crude petroleum obtained from Montrambert (Loire) was distilled at 15 mm. pressure; distillation began at 100° and was completed at 450° C. The gas formed possessed the odor of butadienes and isoprene. The water had an acid reaction, and contained no ammonia. The tar was very different from the ordinary tar in its appearance and its properties. The coke was lighter, more friable and more easily burned. The tar contained no phenols; by treatment with HCl a small quantity of basic compounds was obtained. About two per cent. of oxygen compounds were formed. The remainder consisted of saturated and unsaturated hydrocarbons, the separation of which was made by treatment with liquid SO^2. No hydrocarbons of the aromatic series were found. The ordinary tar, made at atmospheric pressure, consists of aromatics, phenols, naphthalene, anthracene, and pyridine bases. The theory is advanced that the aromatics and other compounds of ordinary tar are formed by the decomposition of the more volatile and complex compounds which are formed at the lower temperatures. This theory is opposed to that of Berthelot, who maintains that the compounds of the tar are the products of the synthesis. The saturated hydrocarbons in the tar made by distillation in vacuo correspond to the formula C_nH_{2n}; of the unsaturated hydrocarbons there have been isolated a dihydrotrimethylbenzene (boils 163-164°), and a hexahydrofluorene, $C_{13}H_{16}$ (boils 240-250°). There is a remarkable resemblance between the hydrocarbons isolated from the tar made in vacuo and those found by Mabery in Canadian and Californian oils. By extraction with benzene, a series of hydrocarbons was isolated from the oil similar to those found in the tar made from the oil by vacuum distillation. This evidence shows that a part, at least, of the compounds of the tar existed in the same form in the original oil.

A Treatise on Smoke Abatement.

By H. Hamilton, via "Gas Journal", 139, 229 (Aug. 7).—The author has published a book entitled, "A Scientific Treatise on Smoke Abatement" for general instruction and especially applicants for examination of the Royal Sanitary Institute. The ground covered by the book is extensive. It embraces a history of smoke abatement, and an explanation of the chemistry of combustion. Then follows a chapter on furnace draught, the composition of chimney gases, and CO_2 recorders. A number of well known stoking appliances are described and illustrated. Suitable methods for stoking furnaces are described. The important parts played by gas producers; gas, oil, and electrical appliances in smoke abatement are acknowledged. —D.

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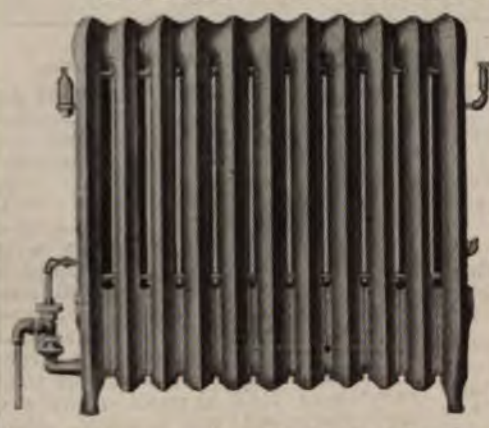

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The Unprofitable Customer

How He Is Developed into a Profitable Consumer Is Graphically Told by a Southern Manager Who Has Studied the Problem for Years

By S. E. De Freese

Gen. Mgr. Chattanooga (Tenn.) Gas Co.

(Prepared for the 1917 Convention of the N. C. G. A.)

The customer who purchases an amount of service which does not return to the gas company the expense incurred to serve him plus a reasonable profit, is an unprofitable customer, and the loss in money to the company is felt, whether the customer be a domestic consumer or listed under any other classification.

I have been convinced for a good many years that public service corporations operating under a small minimum charge per month have contributed largely to the production of unprofitable customers. That is to say, where public service corporations have entered, in the form of franchise regulations, into contracts with municipalities to render service to a customer at a figure below that which it actually costs to supply the customer, they must accept to a large extent the blame for having such unprofitable accounts on their books. This matter has received very little attention in the past by gas companies, and while all of us have realized that we cannot serve a customer for 25 or 50 cents per month, at the same time there have been, and perhaps are now, gas companies that make even smaller minimum service charges per month.

Investigation of this subject will develop that it costs the small gas company from $1 to $2 per month where no gas at all is furnished, but where the company stands ready to deliver service. In the larger cities this expense will be reduced by reason of the number of customers the company has on its books, but there will scarcely be found an instance where the small charge of 25 cents will cover the ready-to-serve expense of an individual customer.

S. E. De Freese.

Keen Competition.

In the past it has been reckoned that, gas companies being monopolistic in their character, a customer making application for gas would certainly use at all times more than the monthly charge represented. It appears to me that for this reason gas companies have proceeded to follow their predecessors who believed in the small minimum charge.

We have come, however, to see the day when keen and aggressive competition has forced the gas companies to change their tactics and to question whether they were ever right in this theory. Without dwelling too long on this feature of the subject, the writer would strongly urge co-operation on the part of the managers and executive officers of the gas company, and a change leading to the adoption of a policy of equity which will bring such matters to the attention of public service commissions, municipal authorities and others in control over gas companies.

As opposed to the minimum ready-to-serve charge which does not cover overhead expense, no more striking example can be found than the telephone companies that do not take on their books any unprofitable customers. The only guarantee the telephone company renders to a customer is the use of the telephone; no specific number of calls enters into the price he shall pay for the use of the instrument, and it does not matter with the telephone company how many calls this customer makes or

WAR COOKERY.

Laclede Gas Light Co. Again Aids Food Conservation in St. Louis.

The Laclede Gas Light Co., of St. Louis, has entered into the war cooking campaigns with the same enthusiasm that marked its activities in the canning and preserving campaigns. The Women's Central Committee on Food Conservation, in following out its efforts to conserve the food supply in St. Louis, has inaugurated a course of "Patriotic Cooking for Cooks." Classes have been arranged through the co-operation of the Laclede Company and St. Louis cook-employing housekeepers, for Fridays from 2:30 till 4 p. m. The classes will be held at the community cannery, in the Laclede building. Mrs. Fabrianson Carlander, in charge of the class, said recently that the government expects the cook to do her part in feeding the soldiers by helping to save the wheat, meats, fats and sugar, and the Women's Central Committee on Food Conservation felt that it would be well to give them an opportunity to become acquainted with the true patriotic manner of cooking.

"We shall teach the cooks," said Mrs. Carlander, "in a series of Friday afternoon sessions, the possibilities of intelligent substitution for these various commodities, and the best and most wholesome ways in which these sub-situations can be utilized."

The Y. W. C. A., Wheatley Branch, will inaugurate the same course for colored maids.

Commercial Manager J. J. Burns, of the Laclede Co., says of the new work:

"St. Louis expects to achieve the same success in war cookery work that it did in the canning, drying and preserving campaign. Three war cookery demonstrations are going on at this time, one under the auspices of the Agricultural Extension Society of the State University at Columbia, Mo., and two are being conducted by the Women's Central Committee on Food Conservation, one is being held in the old Art Museum building and the other in the Laclede Gas Light Co.'s offices, the Laclede company being actively interested in all three demonstrations."

Garden Scene in Ragan's Latest Window Trim.

Here we have a photograph of the latest Ragan window, arranged in connection with a "Humphrey" campaign which was recently put on in Rome (N. Y.). The trim was arranged as a garden scene using fall colors in the color scheme. The fountain shown in the foreground was constructed of cobble stones and moss. In the center was placed a globe with colored electric light bulbs underneath, which as the water sprayed over it, made a very pretty effect. A small celluloid doll was placed on the top of the globe. Several streams of water were arranged to shoot up about two feet and one stream about four feet. Mr. Hinden, of the Humphrey Co., assisted the boys of the Rome Electric Light and Power Co. in the campaign.

THE CHEAPEST FUEL.

Actual Test Shows Economy of Gas Over Coal for Cooking Purposes.

The Baltimore Gas and Electric Co.'s demonstrators recently made a very thorough test to determine the difference in cost between the amount of gas consumed in a gas stove and the amount of coal consumed in a coal stove for the same amount of work. The test was made in a private family of four people and in all consumed two weeks. The cooking, washing, ironing and all other work was identically the same in every detail during each week. The test proved, as the figures below show, that there was a monetary saving of about forty-five cents in gas over coal, not to say anything of the amount of coal which might have been saved to the Nation had it been burned at the gas works.

The test shows that 650 cubic feet of gas was used. This would require only about sixty-five pounds of coal at the gas works, leaving a residue of about one-half that amount of coke, which in turn would still have a heating value for home heating purposes equivalent to about its own weight of anthracite coal. The consumer, on the other hand, used during the week 252 pounds of coal, which is about four times the amount that would have been used at the gas works, exclusive of the above mentioned coke.

On this basis during the course of a year a consumer would use many tons more coal at a higher cost than if the coal were used at the gas works and the gas in turn used in the home. The enormous saving in coal and transportation facilities, and the elimination of the extra handling required to distribute the coal in small lots to the individual consumers which can thus be effected for the benefit of the Nation and the successful conduct of the war is perfectly obvious.

Gas consumed	650 cubic feet
Coal consumed	252 pounds
650 cubic feet at 95c per M	$0.617
252 pounds at $8 a ton	1.07
Saving in two weeks by using gas	.453
Coal saved to Nation	187 pounds

Council Bluffs Office Has Been Remodeled.

Remodeling at the office of the Citizens Gas & Electric Co., Council Bluffs, Ia., has been completed. Probably the greatest feature of the new arrangements is the system of lights installed. It is the last word in lighting effects and must be seen to really be appreciated. It has bowl fixtures, constructed of calcite glass, and radiates out a soft, mellow light which harmonizes closely with the color effect of the whole interior, worked out by Manager A. L. English after long, careful study. Practically every fixture on this floor is new including the metal ceiling and decorations and everything is bright and cheerful.

Rome, N. Y., Window, by Ragan.

A Memphis Sale

The recent Humphrey water heater sales campaign put on by the Memphis (Tenn.) Gas & Electric Co. was one of the most successful of the season, and Secretary V. A. Henderson is still receiving congratulations from his colleagues for having arranged it and pushed it to a satisfactory conclusion.

The success of the sale is attributed to the effectiveness of the newspaper advertising used. This produced live prospects, in whom a strong consumer acceptance had already been created. During the week sales of seventy-three Humphrey automatic water heaters were made. The newspaper advertising run in the two papers cost $725. A sample of the page advertisements is shown on this page. Commenting on the newspaper advertising, one of the Humphrey men on the job wrote the factory about it as follows:

"I want to say I never saw such 'pulling' stuff as this has been. I have been on a lot of sales and I never saw so many people come to the gas office as we have had here. In fact, almost half of our sales have been to people who came in and were sold before we let them get out."

Salesmen Who Conducted the Memphis Heater Campaign.

One of the Full Pages Used in the Successful Memphis Heater Campaign

Mr. Henderson says he considers the sale a success, not only because of the number of heaters sold, but because of the boosting value which will have a good effect.

The Humphrey sales crew co-operated closely with the commercial department throughout the campaign. They are shown in the accompanying picture. These include R. L. Marques, H. O. Dummett, L. E. Spear, L. W. Morris and W. C. Tupper. Mr. Tupper was in charge of the Humphrey crew at this sale. Mr. Henderson, through whom the sale was arranged and who was very enthusiastic and thorough in the co-operation extended to make it a success, is also in the picture.

BETTER AND CHEAPER.

Terre Haute Gas Company Shows Public This Is True of Gas Light

The Citizens Gas Co., Terre Haute, Ind., has enjoyed a very good year in residence gas lighting. Over 350 houses have been piped so far, and 1,600 gas fixtures sold, with a total of 2,200 gas burners. Special care has been given to educating consumers to use gas mantle burners, both for efficiency and economy and this advice has appealed to the householder and made many friends. The company asserts that it can provide equipment equal or superior to anything electrical that can be found, with the added inducement of economy and better light.

"Save the Powder in the Gas"

Editorials and Articles in Newspapers Indicate a Growing Public Recognition of Immense Part Gas and By-Products Play in War—and Peace

An outstanding feature of present war conditions in the United States is the growing public recognition of the valuable services now being contributed to communities and to the nation by public utility companies, particularly gas companies. This recognition, though tardy in arriving, seems to be pretty well established in many sections of the country, though in some localities ward politicians and others with axes to grind still are active in keeping it from the companies.

The most definite evidence that the effort of gas companies to serve faithfully and well is appreciated is in the newspaper expressions that are breaking out in several sections. Not only are many commendatory editorials and news articles appearing almost daily now, in praise of real service, but there is also clearly apparent in the daily press a keen appreciation of the difficulties under which this public utility service is rendered. An example of this is contained in an editorial in the Philadelphia "Ledger," of November 6. It says:

"SAVE THE POWDER IN THE GAS.

"Every time enriched gas is burned in a gas stove, under a boiler or in a mantle lamp, an American soldier is being deprived of explosives he needs in carrying the war into Germany. This is no exaggerated statement; it is the cold truth vouched for by no less an authority than the official journal of the American Chemical Society. It has been for years an economic blunder to burn up valuable materials in gas, but to continue that practice under war conditions is a military blunder as well.

"In a good many lines the war is likely to pound sense into the American head. Ordinary "illuminating" gas might be a pretty good point at which to start right now. In a good many cities there is a candlepower standard which the gas must maintain. This was all right years ago, when gas was burned raw, so to speak, and when it was being used chiefly as an illuminant. The illuminating qualities came from certain vapors which, if not actually existing in sufficient quantity in the gas as made, were introduced by a process of enriching.

"But these substances which furnish the illuminating power are the very substances which can be utilized for the production of toluol, the basis of the best and safest modern explosive, trinitrotoluol, which has been recommended for our own military use abroad. It is certain that if these materials are burned they can't be used to propel shells, and it is equally certain that there is little real reason for burning them.

"The real test for gas today is its heating power, and to this benzol and toluol add but a trifling amount. The use of the gas mantle is virtually universal these days, and where a mantle is used the actual illuminating power of the gas is of no consequence, since the light comes from the intensely heated fiber and not from the gas itself.

"In the face of all this the obsolete candlepower standard has continued to hold its ground, though progressive communities one after another are abolishing it and permitting the use of rich gas constituents for more useful purposes. The war may yet give the old unit of measurements its death blow all over the country, and if it does there is one more mark to its credit."

From Kansas a similar appreciation of the gas company's difficulties and the grim determination to surmount them is printed in the Topeka "Capital" of November 5th. It says:

"The one industry in the United States that has been hit below the belt by war conditions, and yet that has not squealed, or even been heard from, for some reason, is local public utilities.

"Reports of these concerns are made from month to month all over the country, and all show substantially identical effects of war times. That is, together with a normal increase of gross business, an enormous and abnormal increase in expense. Kansas Gas & Electric is a fair sample, a first-class public utility whose 7 per cent. preferred stock has never passed a single quarterly dividend since it was established some ten or more years ago.

"The September monthly report of Kansas Gas & Electric shows for the month, compared with 1916, an increase of $4,128 in gross earnings, from $109,679 to $113,807, and an increase in expenses taxes and interest charges of $17,414. The result is that the month's business shows income after these charges of $25,136 for a year ago, but only $11,850 for September this year.

"The angle of this steady climb of expense is increasing. For the twelve months ending October 1, the gross business was approximately $200,000 more than the same months the preceding year, but expenses were $286,571 greater than expenses last year, and the falling off in income, after charges, for the twelve months amounted to 35 per cent., while for the single month of September the falling off amounted to 53 per cent.

"In other words, the situation is getting progressively worse. This company is still easily earning its 7 per cent. dividend, in the last twelve months earning 6 per cent. over, but how long can expense continue to pile up without forcing some of the best managed utilities to take some action in self-protection? The main trouble is fuel; wages also cut some figure. The Kansas City Railways Co. for the three months ending October 1, shows a deficit of $45,357 against a surplus a year ago of $119,215. Public utilities are unlike other business, which can advance prices. Their rates are fixed. They furnish the single example of a business going along thru war times and war prices without joining the procession, in the matter of balancing their higher costs by higher charges."

Public utility managements are beginning to feel the recognition accorded their endeavors by the public. Recently, in the Chicago "Daily News," O. E. Orsthoff, vice-president of H. M. Byllesby Co., in the course of an interview, said:

"Increased operating expenses at some utilities have brought about a condition whereby the utilities are entitled to higher rates for service. The public and the utility commissions are recognizing the justice of increased compensation. We have found a spirit of fairness on the part of the public wherever these questions have been raised. One of our companies has obtained the consent of large power users to accept temporary advances in service rates by simply presenting the facts. Owing to the price of gas oil our San Diego company has applied to the California railroad commission for advanced rates. The Tacoma Gas Company has filed a similar application with the Washington utilities commission, which recently permitted increased street railway fares in Seattle."

"Thrift Campaign"

Another N. C. G. A. Plan to Help Gas Sales and Promote Good Will

By the N. C. G. A.

Two questions are going to occupy the biggest part of the women's attention this winter. They are food and fuel. In this fact lies the value of the six "Thrift" folders, regular envelope size, on food as cooked by gas, which the National Commercial Gas Association will supply for distribution by gas companies to domestic gas consumers. These new folders are to take up the good work for the period between canning seasons. They will have less to say of patriotism and more about the use of gas. Their appeal to the housewife will be their simple and very practical treatment of a subject that is so vital to American households, at this time, namely, food economy in buying, preparation, and serving.

The folders will be prepared with the idea of increasing gas consumption by:

1. More baking.
2. Home rendering of fats.
3. Grilling of vegetables to offset deep frying (now tabooed by fat shortage).
4. Fish broiling (to reduce meat consumption).
5. More steamed breads (to conserve wheat).
6. Long continued cooking of cheaper cuts of meat, and the legumes as meat substitutes.

The arguments to the consumer for economy will cover:

1. Time saving.
2. Food saving by proper cooking.
3. Energy saving by simple wholesome dishes.
4. Money saving by careful planning, intelligent marketing, proper care of food, cooking to the best advantage, etc.
5. Co-operation with the government in conserving meat, wheat and fat.

The subjects for the folders will be:

1. Break baking—the home-made loaf—simple batters—comparative costs and values.
2. Fish—from market to meal-time.
3. Useful utensils—material, construction, size, shape and purpose in gas cookery.
4. Meat and how to make the most of it.
5. The use of household fats: to make one wise dollar do the work of two foolish ones.
6. Vegetable economy and help for hot weather.

We know the American housewife welcomes practical food suggestions and appreciates proper instruction in the use and care of her gas equipment. A generous distribution of such literature by the gas companies will give valuable publicity, create a spirit of good will, and increase sales of gas at maximum rates to a class of consumer where no additional investment is necessary by the gas company. Although the board of directors of the association approved the plan for publishing these folders, printed in one color without illustrated cover, we have since learned from several commercial managers that they prefer folders with colored, illustrated cover designs, similar to the folders put out during the canning and preserving campaign. Before we proceed with the printing, it is necessary for us to know how many folders you will require and also whether you prefer them printed in one color without a cover design or with an illustrated colored cover.

Price of Folders—F. O. B. New York.

Printed in one color—without illustrated cover ..... $2.25 per 1000

Printed in one color—with illustrated colored cover ..... 4.50 per 1000

As the association has no large working capital, it must finance these "Thrift" folders from the proceeds of sales made to gas companies, and before going ahead, we need pledges that will guarantee the plan being carried to a successful conclusion. Will you, therefore, advise this office promptly the approximate number of each folder you will require, and state whether you want the folders with or without colored illustrated cover.

NOTED CHEF PLEASED.

Theodore DeWitt, of Grunewald Hotel, New Orleans, Now Has All-Gas Kitchen.

The Grunewald hotel, the largest hotel in New Orleans, La., has installed an all gas kitchen. The equipment in the main kitchen consists of seven sections, heavy duty "Garland" ranges, one "Garland" hotel broiler and one salamander. The

Theodore De Witt, the Grunewald Chef.

View of Grunewald Hotel's All Gas Kitchen, New Orleans.

Pushes Gas Arcs

And Kewanee "Combination" Company Finds It Profitable Business

By I. H. Fink
New Business Manager

Kewanee, Ill., has a population of 17,000 and inasmuch as we are a combination company, the commercial lighting by gas had been neglected in favor of electricity for a good many years. Prior to February, 1917, our company only had two outside arc lamps and about 10 inside arc lamps, installed in the town. Today we have 15 outside arc lamps and about 50 inside arcs in use.

Gas Arcs in Kewanee "Movie" Front

Our plan for installing outside arc lamps is on a contract basis for three years. We install the lamps and maintain them for three years, without initial cost to the consumer. He in turn agrees to use the lamps and pay a minimum bill of $3.25 per month for each five-mantle outside arc lamp installed. We have been selling our inside arc lamps outright. We have secured at least 40 merchants in town who have not used gas for lighting for a number of years and whose bills are now running anywhere from $3.25 to $20 per month.

Our regular patrolman who turns the store lights and electric signs off and on, turns on the arc lamps at dusk and off again at 10:30 o'clock, on Saturdays at midnight.

We find it is not affecting our electric business in the least. On the contrary, it is helping it, as we are educating the merchants in this town to have good illumination. A merchant having both gas and electricity installed will nine times out of ten use both. We have had several cases in Kewanee where the merchant had only electricity for lighting and his electric fixtures were out of date. When we installed a few modern gas arcs in his store his electric fixtures showed up so shabby in comparison that he immediately placed orders for new electric fixtures to take the place of the old ones. So the theory that a small combination company should not push gas for lighting is altogether wrong, as one helps out the other.

We have a number of merchants who had electric signs and we showed them where it was to their benefit to install a number of outside arc lamps to illuminate their store front. They are now using our electric signs and gas arcs also. Every merchant is a prospect and with constant solicitation there is no reason why a small or large company cannot secure a great deal of this valuable business. To illustrate: it took four months to persuade a hotel man to install three five-mantle arc lamps on the top of a three-story building to illuminate a large sign.

When a salesman says he cannot sell gas for lighting, it is a safe bet he has not tried. I know of a case that happened a few weeks ago in a nearby town of 3,000 population. The local salesman tried to impress upon my mind that no gas lighting could be sold in that town. I asked him if he had tried to sell any and he said "No, the merchants were in favor of electricity and practically all had abandoned gas in favor of electricity for lighting." I persuaded him to make a canvass of the business district and in two days he had sold five arc lamps and has a great many live prospects which he expects to close in the near future.

William E. McClintock, who has been with the National Utilities Co. of New York for the past two years as consulting engineer in charge of the reorganization of various gas and electric light properties, will resume consulting practice the first of the year, with offices in New York. Mr. McClintock practiced law in Massachusetts for a number of years before getting into the utility business. He intends to make a specialty of examinations and reports on utility properties, work before commissions and reorganizations.

Gas Arcs Illuminating Signs in Kewanee

Denver's Record

Clare N. Stannard's Commercial Department Exceeds Previous Years

All previous records for new business sales were broken in Denver last month. Complete figures as to the total business done in October are not yet available, but it is evident that the amount will be more than $40,000. In commenting upon the figures, Clare N. Stannard, new business manager of the Denver Gas & Electric Light Co., said to Denver's salesmen:

"The showing made during the past month shows the wisdom of the splendid suggestions made by George Williams at the beginning of the war, not to discontinue new business departments, but to put them on a new basis and ultimately they would become self-sustaining and an asset to the companies instead of a liability. Our sales for the year will run to $300,000 as against only $50,000 a few years ago. In other words, you gentlemen have been graduated from the class of peanut merchants into real salesmen, and in order for those of us watching stock to keep up with you, it has been necessary for us to get out of the peanut purchasing class, and where we used to place orders for $500 or $1,000 worth of goods, we now place orders for $30,000 worth."

Clare N. Stannard.

New Business Gains.

Sales by all the new business departments of the Doherty properties are one-half again as much as in 1916, according to a statement recently made by George Williams, manager of the new business department of the organization. Mr. Williams said that the growth this year was typified by the September figures which showed appliance sales amounting to $151,000 for the month, as compared with $59,000 for September, 1916.

In commenting upon the increased sales, Mr. Williams pointed out that the war was chiefly responsible for the greatly increased demand for electric and gas appliances. He said that the war in causing a scarcity of labor in all branches of work, had not overlooked domestic workers, with the result that servant girls were scarce. This scarcity of servants has made the housewives of the country do their own work, and they have tried to simplify that work as much as possible. For that reason the labor-saving gas and electric appliances have been in great demand with the consequent benefit to new business sales.

Urges Good Lighting.

Using as its text President Wilson's recent utterance that "It is evident to every thinking man that our industries, on the farms, in the shipyards, in the factories, must be made more productive and more efficient than ever," the current issue of the "New Business Bulletin" tells members of the Doherty organization that one of the best services they can render at this time is to work for better factory illumination in order to make that efficiency possible. Here are some extracts from the introduction to the "Bulletin" which sum up the attitude of the new business department in regard to its duty at this time:

"A fine service to render your country is to labor unceasingly, selling better factory lighting. Next to the vast resources of this country in men and materials, are the factories that count in the war, and in supplying them with better lighting you are making them more productive. You are thereby surely helping to win the war. Makeshift lighting and obsolete equipment so seriously hamper factory production that the time lost may easily be from fifteen to thirty minutes of each worker's time per day.

A Paying Investment.

"The average cost for installation and operation of good lighting equipment, on the other hand, is a paying investment if it saves but four minutes a day for workers. When 'more production and greater output' is the cry everywhere, every operating plant in the country as well as those now being built or remodeled, must operate all night as well as all day. The one great and indispensible requirement for high-class and high speed production is good lighting—not merely lighting but good

A Pacific Coast Humphrey "Radiantfire" Window.

lighting—and it's quite safe to say that the better the lighting the better the production as well as the quality, for there is little danger that overlighting will be attempted.

"The opportunities to sell lamps and lighting have never before been so numerous, nor has the demand for better lighting ever been so insistent. Men in all walks of life have realized the advantages of good and sufficient lighting from economic as well as hygenic standpoints, and have not hesitated to say so. An analysis of industrial accidents in this country and abroad shows conclusively that, as the days grow shorter in the fall and winter, accidents multiply, indicating that inadequate lighting is responsible for the unnecessary sacrifice of life and limb and waste of material."

Plumbing Trade See Big Demand for Gas Appliances.

In the opinion of the manager of one of the largest manufacturing concerns which turn out gas-heating and cooking apparatus, there was never a time like the present to push the sale of such goods, declares the Plumbers Trade Journal in a recent issue. "The uncertainty as regards an ample supply of coal to take care of the needs of the people owing to unsettled and threatening labor troubles; the high price of coal, to say nothing of the uncertainty of delivery due to the unprecedented pressure on the rairloads because of war preparations underway, all have combined to bring about a condition where some substitute must be provided.

"To my mind," said he, "the logical thing for the people to do is to give up depending upon coal, except, perhaps, where indispensable, and place their dependence on gas as fuel. It is economical and clean and the market affords every description of gas-heating and cooking apparatus to properly conserve the needs of a family. Of course, the advantages of gas for fuel purposes is too well known to require any extended comment, and thousands of families throughout the United States are already using it to some degree, if not almost entirely; but the time has arrived, precipitated by unforeseen circumstances, when the use of gas must become quite general.

"Live dealers and jobbers in plumbing, heating and gas appliances, as well as progressive master plumbers and fitters, noting the trend of affairs, have taken time by the forelock and are making some good sales in this line. At no time has there been such a demand for our manufacturers, nor more appreciated.

"It is no longer a question of creating a demand, of educating the public; it has become a matter of necessity. The high cost of coal, not to mention its possible scarcity and uncertain delivery, is doing the missionary work. It only remains for the jobbers and plumbers to get busy and reap the harvest which is theirs for the asking. That many are doing so indicates that they are awake to the opportunities which surround them, and the great service it is their privilege to render the public in an hour of stress."

There can be little doubt as to the opportunity offered the dealers and jobbers in plumbing and heating supplies, and the master plumbers as regards the sale of gas-heating and cooking apparatus, as outlined by the manufacturer's representative quoted. That the trade, in large measure, is alive to the situation is not strange, yet most encouraging. Progressive firms are ever on the alert as to changing market conditions. The war has, indeed, brought its problems and not the least is this coal question. That the public has at its command gas and gas-heating apparatus to fall back on, which, in large measure, will take care of many household needs, is most fortunate. From all accounts, there is good profit in the sale and installation of such gas appliances, and with an increasing need and consequent demand, it simply remains for the trade to take hold and do business. As a side line for master plumbers it would be difficult to name a more promising or lucrative one than that offered by gas-heating and cooking apparatus.

CONSERVE GAS.

How Wasteful Methods Affect Pocket and Coal Supply.

Thousands of users of gas are under the impression that the boiling of vegetables, etc., can be accomplished more speedily if they burn gas enough to keep the water boiling vigorously and vapor issuing from the container, says the Rochester "Gas and Electrical News."

What Careful Tests Show.

Test No. 1. In this test 1¼ pounds of potatoes were cooked. The gas burner was turned on full and water was allowed to boil vigorously until potatoes were cooked.

Result: Time required 27 minutes. Gas consumed 7½ cubic feet.

Test No. 2. Weight of vegetables and quantity of water same as for test No. 1. Gas burner turned on full until water came to a boil, then burner was turned down so as to prevent water from boiling vigorously. This condition was maintained until potatoes were cooked.

Result: Time required 27 minutes. Gas consumed 3½ cubic feet. Showing that no time is lost and 60 per cent. less gas is required when potatoes are cooked according to the method used in test No. 2.

What the Consumer Loses.

Assuming that this wastage occurs twice daily in 40,000 homes out of the more than 60,000 homes using gas, the yearly wastage would amount to 116,800,000 cubic feet of gas for which consumers would pay the sum of $110,960.

The Effect on the Nation's Coal Supply.

To produce the 116,800,000 cubic feet of gas wasted would require 11,680 tons, or approximately 250 cars of coal.

BIG RADIANTFIRE SALE.

Over 100 Have Been Placed in Rock Island Homes by Peoples' Power Co.

The new business department of the Peoples' Power Co., of Rock Island, Ill., recently completed a very successful campaign for Humphrey Radiantfires in which the personal activities of W. F. Hansgen and E. E. Shafer with an able corps of assistants played an important role. At the outset of this campaign form letters and illustrated folders, printed in colors, were mailed to a carefully selected list of the finer homes in the city. This was followed at an interval of ten days with another personally addressed letter and order blank enclosures, following which came the personal calls of the company's expert solicitors. During all this time impressive advertisements were employed in the local papers using the Humphrey copy and illustrations. Also attractive window displays were employed in the company's fine new show room which is located on one of the city's main thoroughfares. In the displays a cozy interior was simulated using a fireplace with a Humphrey Radiantfire in operation. Over 100 Radiantfires now heat and ornament that many of Rock Island's finest homes.

Georgia Improvements Are Deferred.

In view of present war conditions, the Georgia commission has decided to grant the Rome Municipal Gas Co. until next spring to make improvements on its plant.

New Facilities To Be Provided At Richmond, Va.

The administrative board of the municipal gas plant of Richmond, Va. has directed Superintendent Knowles of the gas works to ask for bids for ten benches of nines and for several ten-foot water gas sets. Other improvements are also contemplated at the gas plant.

Samuel Barrow, commercial manager for the Beaumont (Tex.) Gas Light Co., was married at Houston Nov. 10th to Mrs. Jessie Plummer, of Beaumont.

Gas Appliance Specifications

Report for 1917 of National Commercial Gas Association Committee on Standardization Flexible Tubing, Ranges and Range Parts

The principal feature of the committee's report for 1916 was the "Proposed Standard Specification for Flexible Tubing and Connections."

At the time the report was presented, the committee urged a thorough discussion of the important matter, and subsequently, through the Bulletin, repeated its request for criticisms and discussion. The complete report was published in the Bulletin for February, 1917. Unfortunately, little has been forthcoming. Such discussion as has been received implies that the proposed specification goes into too great detail in its requirements for construction, and is capable of simplification. In fact, it is contended that there is no need to specify detailed construction requirements if definite and comprehensive performance requirements are incorporated properly in the specification. This matter is now the subject of discussion between this committee, the tubing committee, of the American Gas Institute, and the National Bureau of Standards. It is hoped that from these discussions will follow a specification which will be acceptable to the various interests concerned.

The subject of flexible tubing and its connections has received an increasingly large amount of attention during the past year. Not only has this interest been displayed by the gas industry, but various municipal governments have interested themselves. In fact, in one city in this country, there is now in actual operation an ordinance which has as its object prohibiting the sale or use in that city of unsafe tubing connections. When a suitable tubing specification has been generally adopted, there will follow many more of these ordinances, which will have the desired result of making impossible the sale and use of inferior and dangerous tubings, which have worked so harmfully upon the gas business in the past. Some phases of this subject have been commented upon in this year's tentative report of the tubing committee of the American Gas Institute.

Standard Gas Range Cocks.

From several sources the criticism has been received that a more satisfactory composition of metal should be adopted in place of that called for in the specification, the chief ground for complaint being that the lead content is too high which results in brittleness and breakage, as well as in increased cost of tool maintenance in the process of manufacture. The committee has had this matter under discussion with a number of manufacturers and others, and the suggestions which have been received are summarized in the following table:

Present Specification	Copper per cent.	Zinc or Spelter per cent.	Lead per cent.	Tin per cent.	Iron per cent.	Aluminum per cent
	68	19	12	1	—	—
Suggestion "A"	68	24	7	1	—	—
Suggestion "B"	68	24	6	2	—	—
Suggestion "C"	73	23	2	2	—	—
Suggestion "D"	82	15	2	2	—	—
Suggestion "E"	75	16	8	1	—	—
	(or over)	(more or less)	(or under)	(or over)		
Suggestion "F"	76	16	6	2	Max. 0.4	None
Suggestion "G"	74-82	14-17	4-7	1½-2½	Max. 0.4	None

It is evident from the above that there is considerable difference of opinion as to what constitutes the most satisfactory composition, but it seems to be the unanimous opinion that the lead content, as given in the specification, is too high, the percentages recommended varying from two to eight, as compared to the specification requirement of 12. Does the specification require revision in this respect? Your committee feels that it does, and has, therefore, submitted the matter to the American Society for Testing Materials for their advice. The members of the association are asked to forward to the committee any criticisms or suggestions they may have to offer on this subject.

Names for Stove Parts.

The committee recommends the adoption and use, in its standard gas range specification, of the "names of stove parts" as formulated and adopted by the National Gas Appliance Manufacturers' Exchange. This list is given in full in exhibit "A."

Reprinting Specifications.

As the result of the recommendation presented to the two gas associations by their respective appliance committees, it has been agreed between the American Gas Institute and the National Commercial Gas Association that the standard gas range specification and standard gas fixture specification be reprinted as a joint publication of these two bodies. Your committee now recommends that this action be deferred until (1) The final adoption of a standard specification for flexible tubing and connections and (2) revision of the composition of metal for standard gas range cocks, if such revision is found desirable.

Your committee also recommends the substitution of the "names for stove parts" adopted by the National Gas Appliance Manufacturers' Exchange, when the specifications are jointly published.

Respectfully submitted,

Committee on Standardization of Gas Appliance Specifications, National Commercial Gas Association.

Edward B. Myers, Chairman.

EXHIBIT "A."

Names for Stove Parts.

Burner Tray—To supplant such names as dirt tray, dust pan, scavenger pan, dirt pan, drip pan, etc.

Broiler Pan—The pan in the broiler.

High Shelf—Being the complete high shelf as ordinarily used on a cabinet range.

Canopy Shelf—Being the canopy and shelf that is attached to the range, and supplanting such names as hood, small canopy, etc.

End Shelf—Meaning the shelf at the end of the top frame.

Leg Shelf—Meaning the shelf located between the legs of a cabinet range, supplanting low shelf and leg pan.

Enamel Splasher—The word splasher is not to be used except in the case of enamel splasher only. Some manufacturers have called what we term the high shelf, a back splasher.

Cast Iron Parts.

Top Grate—Supplanting the terms top grid, burner grid, etc.

Top Burners—Giant. Regular front. Back, R. or L. Simmering.

Top Burner Support—Front. Back. Different manufacturers use different styles of support, but we favor in all cases calling it the top burner support.

Top Burner Support Holder.

Oven Burner Support.

Oven Burner.

Oven Lighter—To supplant pilot light, open door oven burner lighter, etc.

Front Frame—Meaning the main

frame of the gas range. In cases where this front frame is in two pieces, it shall be designated upper front frame and lower front frame.

Top Frame—Meaning the main frame of the cooking top.

Base—Meaning the cast iron base of the range. This name base will apply whether band iron, angle iron, or sheet steel base is used.

Leg—Supplanting the name foot, etc.

Oven Door Frame—The frame of the oven door itself.

Broiler Door Frame—The frame of the broiler door itself.

Flue Collar—Supplanting the name pipe collar, etc.

Hinge Box—Right or Left. Oven or broiler. Supplanting hinge cap, journal box, etc.

Door Springs—Right or left. Oven or broiler.

Name Plate.

Door Catch.

Top Frame Support—Some people have called this part right or left stands, and some have called it burner box corners.

Oven Burner Body Plate—Being the plate on the outside of the body of the range through which the oven burners project. This has sometimes been known as manifold plate, mixer plate, dial plate, etc.

Manifold—Front—Gas supply pipe for cooking-top burners. Oven—Gas supply pipe for oven burners. Riser—Gas supply upright pipe.

Manifold Support—Front. Oven.

Manifold Support Clamp—Front. Oven.

Cocks—Fixed orifice. Adjustable.

Air Shutter—Supplanting mixer cap, mixer shield, air slide, etc.

Oven Rack.

Broiler Rack.

Broiler Pan Rack.

Sheet Iron Parts.

Oven bottom, oven right side lining, oven left side lining, oven back lining, oven top lining, broiler right side lining, broiler left side lining, broiler back lining, broiler bottom, extreme bottom, range body, oven door panel, broiler door panel, oven door lining, broiler door lining, burner box, burner box lining.

Top Back Strip—Meaning the small sheet iron back strip at the top and back of the high shelf or oven on a cabinet range, sometimes known as a mantel back.

Catalogue Pages.

After careful consideration, your Committee recommends that gas ranges be catalogued fully equipped with enamel parts and that the range numbers cover these ranges so equipped. The equipment shall include enamel door panel, enamel burner tray, enamel broiler pan, and enamel splasher.

In the interests of standardization and with a view to lowering costs of production, no deductions for any equipment eliminated should be made except for enamel splasher.

We recommend that the enamel splasher consist of two pieces only, one on the oven body side and one on the high shelf, but no arch piece.

Standard Abbreviations.

G—Glass door.

W—Roll top warming closet.

C—Canopy shelf.

N—Natural gas.

R—Right hand oven, facing the range.

L—Left hand oven, facing the range.

E—Enamel splasher.

It is understood that all ranges are equipped to be used with manufactured gas unless the letter "N" follows the number, signifying "natural gas." In this connection, the word "manufactured" is to be used, and not "artificial."

Enameled parts are to be known as "enameled parts" and not as "porcelain" or "porcelain enamel." (Signed) T. J. Potter, Chairman; John D. Green; David F Kahn, Joseph E. Nason, and Mabon P. Roper.

THE GAS LADY.

In Chicago She Is Taking the Place of the Customary Male "Trouble Shooter."

In Chicago the gas "trouble shooter" has gone to war and the gas woman has come to replace him. All the work of adjusting gas stoves has been placed in the hands of women by the Peoples Gas Light & Coke Co. John Williamson, vice-president of the company, will be known to the future as "The Father of the Gas Ladies." He originated the plan.

"I'd been thinking," said Mr. Williamson the other day, "that soon we'd have to put women to all sorts of work. Then a little while ago I saw a moving picture called 'How England Prepares.' That showed women doing all sorts of work as mechanics that I had no idea they could do. So when all our gas men started to go off to war I decided to replace them with women.

"Is it successful? It certainly is. It's so successful that I'm really disappointed. From the reports I get I think the women are doing better than the men. They are better received in the houses—there is less suspicion and a women can talk to a woman. I don't know what this will develop into. Perhaps we'll soon have plans for women in other departments. We have ten women out working in the houses now and five in school. The school is one we had for gas fitters. The course lasts a few days and then we get a new lot of pupils."

The school is a huge room filled with an incredible variety of stoves, meters, ranges, heaters, lamps, to say nothing of intricate pipe connections.

The pupils are instructed in the vagaries of a gas stove by C. V. Morgan. They announce, collectively and individually that they are delighted with their new jobs.

"You know it isn't really dangerous," explained one of them. "As soon as you realize that the popping of a stove doesn't mean anything you are all right. We are not going to wear uniforms, except perhaps some sort of sleeve protector. We'll each carry a canvas bag of tools."

Mr. Morgan declares the women learn just as quickly as men and that the graduates of the school send in delighted reports. Most of the women have come straight from homes; only a few have worked before.

"I've worked in offices all my life," said a recruit from the company's Michigan avenue offices, "but I'm sure I'll like this much better. It's certainly fun now."

The course is brief. The women work for three days in the school room on sample stoves. Then they go out for three days' postgraduate study "in the field." Two women go together, make the repairs and are followed up by a veteran gas man to see if the work is satisfactory.

They receive $12 a week to start and work from 8:30 to 5, with an hour off for lunch.

The Laclede Gas Light Co., of St. Louis, is preparing to train women as meter readers to replace men needed for military and other war service. Women first will be used in the clerical department and later will be trained as meter readers and collectors.

CLARK'S ARGUMENT.

Shows Boston Folks How They'd Better Use Gas and Conserve Coal.

J. C. D. Clark at Boston overlooks no opportunity to inform his fellow citizens of the strong case that gas presents. A recent Gas vs. Coal advertisement run by the Boston Consolidated Gas Co. put up a pertinent proposition in the following manner:

"If you are fortunate enough to have any eight dollar coal in your bin, we suggest that you hang on to it as long as possible, by using gas for heating, cooking and water heating. Gas is better than coal, anyway. It's cleaner, gives less trouble, and does the job in a much more satisfactory manner. At present prices of coal our suggestion to use gas seems almost superfluous. Some people, however, may not realize how conditions have changed in the last dozen years. Twelve years ago gas was $1.00 per thousand feet and coal $6.75 per ton. To-day gas has gone down to 80 cents per thousand, a reduction of 20%, while coal in Boston has gone up to $9.50, an advance of 40%. At these prices, 6,750 feet of gas could be bought in 1904 for the cost of one ton of coal, while today 11,875 feet of gas can be bought for the cost of one ton of coal.

OPINIONS AND COMMENTS

BUSINESS ADJUSTED

"There is every reason to believe that the adjustment of business to a war basis is nearly completed. For months the country has been dealing with uncertainties—trying to anticipate the effec t of war legislation and to gauge the extent to which war requirements would divert the stream of accustomed business. THESE ARE NOW CERTAINTIES. It may be assumed that most of the radical changes in the conduct of trade and industry have already been made, and that any further supervision will be in the nature of extensions of policies already laid down. While there is still some doubt as to the ultimate effect of taxes, combined with high operating costs, upon corporate profits, there is lessening apprehension even on this score. Price-fixing on the whole has been done wisely, perhaps more wisely than is generally understood. Our most vulnerable spot, through which disastrous consequences might ensue upon a sudden ending of the war, is in the matter of prices. Artificial price regulation of our principal basic commodities, while snuffing out all legitimate price advances along with speculation, should tend to stabilize our whole price structure, AND SHOULD PROVE MOST EFFECTIVE IN ARRESTING ANY PRECIPITATE DECLINE IN VALUES when the enormous consumption of commodities for war purposes comes to an end."—*National Bank of the Republic, Chicago, Nov. 1st.*

"In view of the paramount importance of meeting the increasing need for by-products obtained from the carbonization of coal at gasworks, the Minister of Munitions wishes to impress upon those possessing gas-burning appliances the desirability of using gas in preference to any other means of obtaining light, heat, or power."—The British Government.

N. C. G. A.'s GOOD WORK.

We are sure that no one interested in the success of the gas industry can fail to appreciate the splendid educational and constructive work which is being done by the National Commercial Gas Association. Through all the vicissitudes and trials of the past year this important organization has borne its full share of the burdens and has shown ability, capacity and energy in keeping with all of the industry's best traditions. Unselfishly, too, it has shown a worthy spirit in the movement for a more centralized body which we hope and believe will insure still greater achievements in the commercial line. While urgent war-time economies in respect to time, labor and finance have rendered the holding of the customary convention inadvisable this year, THE RECORD is impelled to pause, as will many of its readers, at this time, and reflect upon the performances of the past twelve months. New records were made in Gas Range and Water Heater Weeks. Industrial uses for gas have been multiplied, enlarged and improved. Educational work has been extended along broader and better lines and the matter of good showrooms and display windows has made notable progress. More and better advertising also has been effectually preached in almost every important company. Helpful gas literature has been produced in the form of handbooks and the feature contents of the various gas journals has been emphasized in a manner that THE GAS RECORD, for one, appreciates. Can any gas man deny or detract from the glory of such work? The commercial branch of the gas business is extremely important to the industry's success and we shall be immensely disappointed if the alliance of the N. C. G. A. and A. G. I. does not give both organizations better facilities and stronger support. Let the good commercial work go on. Its opportunities are boundless.

The GAS RECORD

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W. H. Graffis . . . . . *President*
H. D. Fargo . . . . . *Vice-President*
H. B. McMeal . . . . . *Secretary*
Herbert Graffis . *Treas. and Adv. Manager*
Milt Saul . . . . *Vice-Pres. and Editor*
Walter V. Turner . . . *Technical Editor*

SUBSCRIPTIONS

The subscription price of THE GAS RECORD is $2 a year in the United States, Cuba and Mexico; in Canada it is $3; in all other countries, $4; single copies, U. S. A., 25 cents.

ADVERTISING

THE GAS RECORD is issued the 2nd and 4th Wednesdays of each month. Copy can be accepted as late as the Monday previous to each issue. Where proof must be seen, allow ample time for transmission in the mails.

Display Advertising—Rates on application. Classified Advertising — "Wants," "For Sales," etc.—5 cents a word per insertion, minimum charge $1.

RANGE MAKERS.

It's a bum blast that blows no good to anyone. One range maker instead of telling his boys to lay down on the market on account of the high cost of material, is taking the opportunity to make excellent quality salesmen of his men. A course of education in the metal market and a full recital of the manufacturer's difficulties in being compelled to go to the open market to pick up material that will keep the plant going and quality uniform, have put the sales force "wise" to the situation and they ease the burden of the "boss" by explaining things correctly and clearly to their customers.

The recent action of the government in setting prices on steel has added to the troubles of the gas range makers as the purchasers apply the government's orders to their own requirements instead of to the munitions business for which they were intended. So, taking one consideration with another, a range maker's lot is not a happy one, at the present writing.

As one appliance maker states it: "The gas companies have no competition worth speaking of in their gas range business, so they oughtn't to be afraid to ask higher prices. It is a certainty that higher prices are necessary if the appliance maker is to get a living profit."

CONSTRUCTION NEWS

Easton Utility Installs Conveyor Equipment.

The Pennsylvania Utilities Co., operating the Easton (Pa.) Gas Works and an electric light plant, has installed at its storage yard new coal handling equipment, which should reduce the cost of handling coal in and out of storage to about one-third of the amount paid heretofore. New coal storage equipment is being installed at the Dock St. plant which will greatly reduce the cost of demurrage by having to hold coal in cars as hertofore. A complete new ash handling department has been put into operation, which reduces the cost of handling ashes to about 15 per cent. of the original cost. Arrangements are being made for a trolley connection between the Dock St. plant and the company's coal storage and ash dumping grounds. This work should be completed before the end of the year, and will facilitate the handling of coal and ashes by the use of trolley cars instead of by motor trucks as at present.

New By-Product Plants for Japanese Gas Companies.

The Western Union Gas Co. in Kyushiu, Japan, has started the installation of a by-product coke oven capable of producing 85 tons a day and is expecting to begin manufacturing of coke next spring. In addition to this the Hokkai Gas Co., it also is reported, plans an installation capable of 75 tons a day.

Government Plans for Amortizing Recovery Plants.

Statistics gathered for the Committee on Chemicals of the Council of National Defense from the principal gas manufacturing plants in the large cities of the country, showing the amount of toluol that could be salvaged from these plants for use in making trinitrotoluene for explosives, have been submitted to the War Industries Board. This subject and how the government might amortize the plants have been carefully considered by the Chemicals Committee, of which Dr. W. H. Nichols is chairman. Important announcement on this subject is expected to be made shortly. It is pointed out that the government must have, as soon as possible, all the toluol that can possibly be gleaned from these gas plants or elsewhere. The Chemicals Committee hopes to be able to anticipate the demand.

New 30-in. Transmission Line for Baltimore Consolidated.

The coke-oven gas which the Baltimore Consolidated Gas Co. receives from the Bethlehem Steel Co. is a by-product of 120 Koppers ovens. The Steel company now is building 240 additional ovens and, as the available gas will be trebled and too great for the existing transmission line, the gas company is laying a new transmission line consisting of five miles of 30-in. bell and spigot cast iron pipe and about 3,300 feet of 24-in. flanged steel pipe.

Make More Toluol

Government Co-operates With Brooklyn Union Gas in Its Production

Officials of the government and the Brooklyn (N Y.) Union Gas Co. have virtually reached an agreement for the immediate installation by the government of apparatus at the company's plants for the reduction of toluol. The same plan may be carried out soon with other concerns; in fact, already is under consideration. The toluol plants will be operated by Brooklyn Union Gas and the terms as regards price of the product, etc., will be determined later. The agreement is the result of the government's need for toluol, used in the manufacture of high explosives and its desire to have the gas companies make toluol. This was disclosed at a recent hearing before the public service commission on the proposed change in Brooklyn's gas standard from twenty-two candlepower to a British thermal unit standard, under which latter standard gas companies can produce toluol as a by-product. In a recent communication to the public service commission the company stated that, based on a standard of 600 British thermal unit standard, the company can make 800,000 gallons of toluol annually. However, the company has not yet accepted the commission's order, it being optional with the company to change the present twenty-two candlepower standard to one of 650 British thermal unit standard. The company now furnishes only 636 thermal units to produce twenty-two candlepower gas, hence the order, the company contends, means an increase in quality without an increase in price. This matter will undoubtedly be adjusted now by the government authorities, the commission and the gas company.

Marion Ind. Plant Rapidly Nears Completion.

Work on the new gas plant at Marion, Ind., is progressing rapidly and S. H. Linesmeyer expects to have the plant operating by December 15. John Swanson, of the Stacy Bros. Gas Construction Co., is erecting the holder and oil tanks and T. J. Danehy, of the Gas Machinery Co., is installing the water gas apparatus. W. A. Miller, formerly of Cincinnati, is the engineer in charge of all construction for the Central Indiana Gas Co. properties.

Lititz, Pa., Plant Sold To Dutton and Schall.

The Lititz, Manheim and Ephrata (Pa.) Gas Co., John and Thomas McDermott and A. L. Worstall, of Philadelphia, owners, has sold out to Henry Dutton, Jr., of Dallastown, and John L. Schall, of York. The Lititz plant is to be entirely remodeled. The line will be extended to Ephrata, and possibly to Brownstown, Lexington and Brunnerville. Of late the service has been very unsatisfactory, a state of affairs the new company will promptly remedy, having planned to spend quite a large sum for improvements and extensions.

Washington (N. C.) Gas Co. Has Been Reorganized.

The gas company at Washington, N. C., has been reorganized and incorporated as the Washington Gas Co. L. A. Watres, Scranton, Pa., is president, Geo. T. Leach, Washington, N. C., vice-president, Judson Harney, Scranton, Pa., treasurer, S. C. Bragaw, Washington, N. C., secretary, J. T. Bland, superintendent and new business manager. Improvement will be made in the plant and distribution system.

Contract and Billing Methods Used at St. Joseph, Mo.

The St. Joseph (Mo.) Gas Co. always has made a practice of delivering bills by meter readers, except when consumers are at too great a distance, when they are mailed. The large manufacturers always are prompt in paying and the company always mails their bills.

Applications for service are never taken over the telephone, for the reason that when the consumer makes application at the office for gas, he signs an application card according to the rules, which is witnessed by one of the company's clerks. Otherwise many consumers deny their signatures which makes it difficult to collect the bills. For the same reason, the company never sends any one to the house to take an application, except in very rare cases.

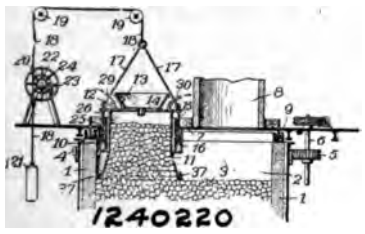
RECENT PATENTS

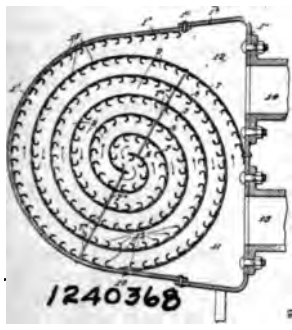
By R. S. McBride, U. S. Bureau of Standards

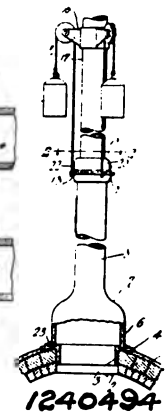
Patents on subjects of interest in the gas industry were granted on the dates indicated. The page in the Official Gazette of the United States Patent Office of these dates is shown in parenthesis for each patent. Numbers marked thus (*) are illustrated. Printed copies of patents are furnished at 5 cents each by Commissioner of Patents, Washington, D. C.

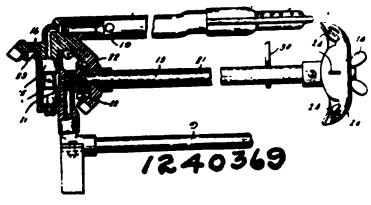
Patents Granted September 18, 1917.

1,240,220.* GAS-PRODUCER. Ebenezer A. W. Jefferies, Worcester, Mass., assignor to Morgan Construction Co., Worcester, Mass. A gas producer comprising a section inclosing a chamber for the reception of fuel, a fuel magazine eccentric to said section and with its lower end arranged to rest upon the fuel in said chamber, and means for causing relative rotation between said section of the producer and said magazine to cause the lower end of the magazine to move along the surface of the fuel, the edge of the delivery opening at the lower end of the magazine being lower at its side









nearest the approaching fuel than at its opposite side.

1,240,368.* GAS PURIFIER. Claude E. Reese, Caney, Kansas.

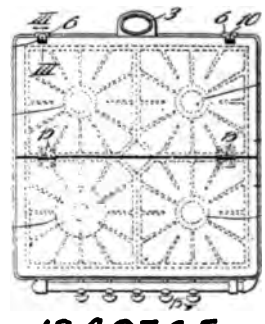
1,240,369.* COMBINED SIMMER BURNER AND LIGHTER FOR GAS STOVES. Frank W. Reynolds, New Washington, Ohio.

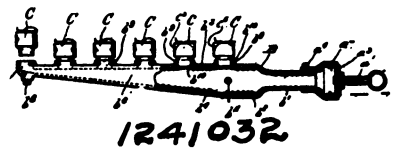
1,240,397. APPARATUS FOR PRODUCING LIQUEFIED GAS. Linus Wolf, Chicago, Ill. In an apparatus for producing liquefied constituents of a gas containing hydrocarbon constituents, the combination with a cooling chamber, of means to cause the gas to pass therethrough, means to compress said gas and liquefy the liquefiable constituents thereof, and means to return a portion of the liquefied gas to the cooling chamber and to allow it to expand therein and become commingled with the gas passing therethrough whereby the gas in the cooling chamber is highly refrigerated by being commingled with the cold gas produced by the expansion of the liquefied gas.

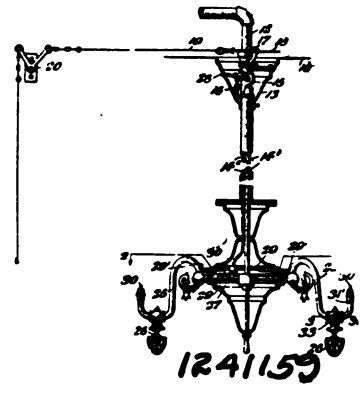
1,240,494.* GAS-COLLECTING ATTACHMENT FOR COKE-OVENS. Hans P. Scheel, Tenino, Wash. The combination with a coke oven having a feed opening in the top thereof, of means for conducting gases from the oven, said means including a gas conducting pipe supported above and in line with the opening, and a hood removably mounted on the oven and around the opening and below and communicating with the pipe, said pipe and hood being concentric with the axis of the opening.

1,240,531. REGULATING MECHANISM FOR CENTRIFUGAL COMPRESSORS. Otto Banner, Easton, Pa., assignor to Ingersoll-Rand Co., Jersey City, N. J.

1,240,539. REGULATOR FOR FLUID-COMPRESSORS. Emery L. Buckley, Painted Post, N. Y., assignor to Ingersoll-Rand Co., Jersey City, N. J.





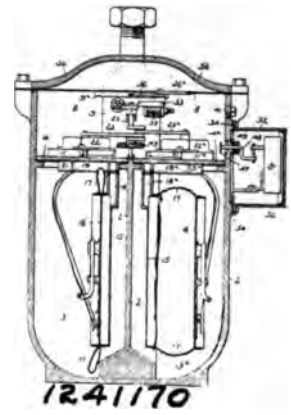


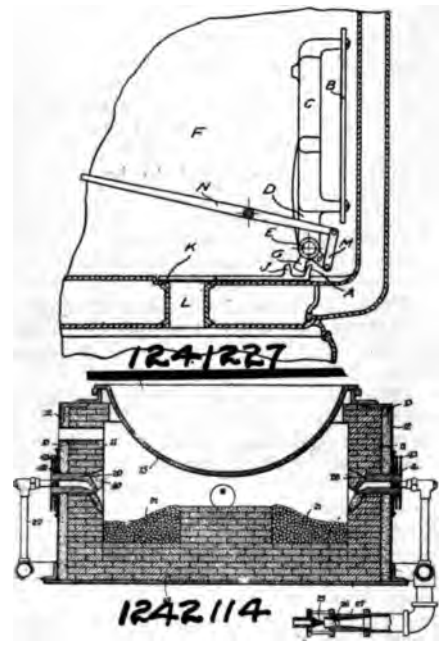
1,240,707. ELECTRIC LIGHTER FOR GAS-STOVES. Frederick C. Gutenberger, Sacramento, Cal. An electric spark device.

1,240,745.* RANGE-COVER. Lee K. Love, St. Louis.

Patents Granted September 25, 1917.

1,241,032.* BURNER. Frederick D. Schneider, New Brunswick, N. J., assignor to the Long-Landreth Schneider Co., New Brunswick, N. J. A burner comprising an elongated hollow member provided along one side with a plurality of transversely directed orifices, opposite





ends of said member being closed and provided with an inlet opening respectively, said member being of progressively constricted dimension away from and of somewhat constricted dimension of said inlet, and a bar extending across the larger portion of said chamber and below the orifice nearest said inlet.

1,241,111. BURNER. Albert Hayes, New York, assignor to Carnot Development Corp. A surface combustion burner.

1,241,154. WATER-HEATER. John Setecka, Chicago, assignor to James Teteak, Chicago. A water heating attachment for gas stoves, comprising a tubular annular member, having an inlet and an outlet at the under side thereof, means for supporting said member from the top of the stove, consisting of a plurality of arms extending radially from

the exterior, for engagement with said stove top, said member provided with a plurality of inwardly extending tubular vessel supporting arms, and a sheet metal baffle member formed to overlie the radially extending supporting arms to be supported thereby, and bent down at an angle between the arms with a space between the baffle and outer and upper sides of the annular member.

1,241,159.* GAS-CHANDELIER. Adolph Spielman, Philadelphia. Apparatus of the character stated embracing the combination of a conventional form of gas chandelier including the casing and canopy, supply pipe, burner brackets and burner-valves with a gas-control valve for the supply pipe and located at the top of the chandelier and concealed by the canopy thereof, a pilot-tube manifold located at the bottom of the chandelier within the casing, pilot tube connecting the control valve parts with said manifold, pilot-tubing connecting the manifold with one side of a burner-valve and pilot-tubing connecting the other side of a burner-valve with a burner there being a passage-way through a burner-valve to establish communication between the tubing, which tubing is concealed by a burner bracket.

1,241,170.* FLUID-METER. Frederick C. Viney, Philadelphia, assignor to John H. Blye, Philadelphia.

1,241,227.* STOVE. Frank O. Larson, Aurora, Ill., assignor to Rathbone, Sard and Co., Albany, N. Y. The combination of a stove provided with an oven; a gas oven bottom; a burner connected therewith; rotatable means for mounting said gas oven bottom and burner within the oven; a pinion connected with said means; a sliding damper; a rack on said sliding damper adapted to be operated by said pinion; an air inlet in the bottom of said oven adapted to be closed by said damper; and means without the oven for moving said gas oven bottom and said damper simultaneously.

Patents Granted October 2, 1917.

1,242,023. GAS-GATE-HOOD CLAMP. John Murphy and Joseph Bechtel, Ashland, Ohio.

1,242,093. MEANS FOR RECORDING READINGS OF METERS. Joseph H. Weeks, Battle Creek, Mich., assignor of one-half to Joseph W. Bryce, Battle Creek, Mich. In a recording device for registers, the combination of a casing, a registering mechanism therein, and punching devices connected with the registering devices, means for impaling a card upon said devices, and compressible cushions on the punching devices for clearing the punctured cards therefrom.

1,242,114.* APPARATUS FOR BURNING EXPLOSIVE GASEOUS MIXTURES. Charles E. Richardson, New York, William Barton Eddison, Irvington, and Henry L Read, New York, assignors to the Surface Combustion Co., New York.

Merger of Public Utility Companies at Rochester, N. Y.

The Rochester (N. Y.) Railway & Light Co., the Canandaigua Gas Light Co., the Despatch Heat, Light & Power Co., and the Eastern Monroe Electric Light & Gas Co. have been merged. The lighting interests of the Ontario Light & Traction Co. also have been acquired and become part of the system of the Rochester company. The first gas company in Rochester was organized in 1848.

COURTS-COMMISSIONS

Deposits Required of California Gas and Electric Consumers.

In the application of the Los Angeles Gas & Electric Corporation, the Southern California Edison Co., and Southern California Gas Co., the state utility commission has ruled as follows:

The requiring of a deposit to guarantee payment of bills for gas or electric service ranging from $2.50 to $5.00, based on the number of rooms in a residence, is held to be excessive. Utilities should not be permitted to require a deposit in excess of $2.50 where the average bill for domestic service is less than $2.00 per month.

The general rule heretofore established by the commission permitting gas, electric and telephone utilities to require a deposit of $2.50 to guarantee bills for ordinary domestic service was established as the maximum amount which could be demanded for such purpose and not the minimum amount as interpreted by certain utilities.

In establishing an amount which a utility could demand to guarantee the payment of bills the commission sought to minimize the burden on all consumers due to increase in rates to take care of losses caused by uncollectable bills, the prevention of all losses through uncollectable accounts is practically impossible.

Applicants authorized to file and put into effect the following schedule of amounts to be required as deposits to guarantee bills: Domestic gas or electric service, residence of four active rooms or less, temporary seasonal occupancy, $2.00, permanent occupancy, $1.50. Residences, five to seven active rooms, $2.50, eight or more active rooms, $5.00.

Newburyport Company Gets Increase To $1.40 Net.

The Massachusetts commission has issued an order that the Newburyport Gas & Elec. Co. is authorized to charge for gas sold and delivered after Oct. 1, 1917, not exceeding $1.40 net a thousand cubic feet for the duration of the war, in lieu of the $1.35 rate that formerly prevailed.

New York & Richmond Gas Co. Seeks Funds for Improvements.

The New York & Richmond Gas. Co., of Stapleton, L. I., N. Y., has asked permission to issue bonds for $2,214,400 for improvements, etc.

Martinsville (Ind.) Gas Co. Increases Its Capital Stock.

The Martinsville (Ind.) Gas & Electric Co. has increased its capital stock from $150,000 to $200,000.

BUFFALO GAS PROBLEM.

Supply Inadequate Despite Increased Production and Storage Facilities.

At the hearing held in Buffalo last week, concerning the gas supply for that city, Judge Barhite, of the New York Utility Commission, indicated that it was the idea of the commission to give preference to users of gas for domestic purposes. In Cleveland the question was decided in that way. Before the Public Service Commission makes a decision Judge Barhite will confer with a committee, named at the hearing, composed of John W. Van Allen, chairman, E. C. Sutton, Franklin D. L. Stowe, A. J. Elias and E. B. Holmes.

There are in Buffalo about 77,000 users of natural gas. Of that number 177 are manufacturers, many of them just now engaged in work for the government, and they complained that the curtailing of their supply of natural gas would mean the crippling of their operations. Asked if it was not possible for them to get along with artificial gas, it was found that such a transfer of service was possible, but the objection to that plan is the increased cost to the manufacturer—an increase from 30 cents a thousand to $1 a thousand.

Natural gas is used in 8,883 house furnaces in Buffalo. The figures of the Iroquois Gas Co. show that these furnaces burned 444,000,000 cubic feet of gas last January. During this year about 1,100 new customers have been added to the company's books. In that time the United Gas Co., which supplies the Iroquois company, has drilled 29 wells, and of that number 14 are productive. Buffalo has available as a result of the drilling of these wells about 23,000,000 cubic feet of gas. There is a net gain, B. C. Oliphant, president of the Iroquois company, said, but it is not sufficient to keep pace with the increased demands. The company has increased its storage facilities in Cattaraugus county, where there are tanks that will hold 280,000,000 cubic feet.

Sheridan, Wyo., Plant in Receiver's Hands.

Application for a receivership for the Sheridan (Wyo.) Gas Co. was presented to the district court and the appointment of R. E. McNally was made the same day. The object is to place the company upon a better financial basis, enlarge its capital and extend its usefulness. The business of the company will proceed as usual and the gas plant will of course continue to operate. Mr. McNally has assumed charge of the business and things are running as usual.

PROBLEMS IN THE GAS BUSINESS

Conducted by W. M. Henderson, Assistant Engineer Gas Department, Pacific Gas & Electric Co., San Francisco.

ANSWERS TO QUESTIONS.

234—Gases.

What are the constituents, explosiveness and characteristic of the following gases Air, sewer gas, coal gas, coke oven gas, town gas and gasoline?

Air—Air consists of approximately 20.96 parts of oxygen, 19.0 nitrogen, 0.04 of carbon dioxide, and other impurities, by volume. It is colorless and odorless. It has a specific gravity of one, and forms a basis to which the specific gravities of other gases are referred. It is no explosive in itself, but furnishes the oxygen necessary for the explosion of other gases, which by themselves may be non-explosive.

Sewer Gas—Sewer gas consists of approximately 90 parts of nitrogen, two to four parts of oxygen, one to three parts carbon dioxide, three to five parts of carbon monoxide, methane and other gases, by volume. The specific gravity varies with its composition and is approximately one, or the same as air. It has an odor due to the organic decomposition constantly going on in the sewage with which it is in contact. It is not poisonous in the true sense of the word, but due to its high percentage of nitrogen and low percentage of oxygen, it will not furnish a sufficient amount of oxygen to support respiration, and hence a person is slowly smothered in an atmosphere of this gas. It is non-explosive in itself, and, due to its high nitrogen and low oxygen content, would undoubtedly prevent the explosion of otherwise explosive gas when mixed with it, unless some other gas such as air were added to furnish the necessary oxygen for the combustion.

Coal Gas—Coal gas is made by the destructive distillation of high-volatile coal in clay retorts. Its composition varies with the kind of coal used and the details of manufacture. It consists of approximately three parts of illuminants (ethylene, etc., of the $C_n H_{2n}$ group), 35 to 40 parts of marsh gas, 45 to 50 parts hydrogen, 4 to 8 parts carbon dioxide and three to five parts nitrogen, by volume. It is colorless, but has a very strong penetrating odor, so that a small percentage of coal gas mixed with air may be readily detected by the sense of smell. In itself, it is not explosive, and must be mixed with air or some other gas which will furnish the necessary oxygen for combustion. A cubic foot of ordinary coal gas requires 1.21 cubic feet of oxygen, more or less, due to the variations in the constitutents of the gas, for complete combustion. If we allow 20 per cent. of oxygen in the air, then for complete combustion 1.21 by 5=6.05 cubic feet of air is necessary to furnish the oxygen for the combustion of one cubic foot of gas. An explosion will take place with mixtures of from four to twelve parts of air with one part of coal gas, the intensity of the explosion varying with mixture. The specific gravity of coal gas varies with its composition from 0.50 to 0.60, or it is about one-half times as heavy as air.

Water Gas—Water gas is made by passing steam through a bed of incandescent carbon. Water gas thus made would have a comparatively low heating value and relatively small candle-power. Therefore, it is enriched by spraying volatile oils on pure water gas while passing through towers filled with checker-work brick, which are heated to incandescence. The composition of water gas varies with the details of manufacture. Water gas is composed of approximately 25 per cent. carbon monoxide, ten per cent. illuminants, 30 per cent. of hydrogen, one per cent. oxygen, three per cent. carbon dioxide, 25 per cent. methane and six per cent. nitrogen, by volume. It is non-explosive in itself and must be mixed with air or some other gas which will furnish the oxygen necessary for combustion. It has approximately the same explosion range as coal gas. It is extremely poisonous, due to its high carbon monoxide content. It has a penetrating odor, even more noticeable than that of coal gas. The specific gravity of water gas varies from 0.45 to 0.55 with its composition.

Coke-Oven or Solvay Gas—Coke-oven or Solvay gas, like coal gas, is made by the destructive distillation of coal in ovens. In coal gas manufacture, the gas is the main product, while coke is a secondary or residual product. In coke-oven gas manufacture, the coke is the main product and the gas is a secondary or residual product. The composition of coke-oven gas is similar to that of coal gas. Like coal gas, it is non-explosive in itself, but becomes explosive when mixed with various quantities of air. The range and the intensity of the explosion are approximately the same as those of coal gas.

Illuminating Gas or City Gas—Illuminating gas or city gas as generally distributed, may be coal gas, water gas, Solvay gas, or a mixture of any two or all of these gases. It is colorless and has a strong penetrating odor. Gas fitters can detect a leak in a gas fixture by the sense of smell, that will not light. It has ordinarily a specific gravity of 0.50 to 0.60 or about one-half that of air. It is non-explosive in itself and will explode only when mixed with four to twelve volumes of air. City gas stored in a gas holder would not explode if the holder were struck with lightning. If the tank was ruptured sufficiently to let any large amount of gas escape, there would simply be a flash similar to that following the throwing of a lighted match into an open barrel of gun powder. I have seen workmen mark leaks on a gas holder by igniting the gas issuing from the holes.

Gasoline—Gasoline of the American trade varies somewhat in its specific gravity from 0.70 to 0.74 as measured by the Baumé scale. 0.70 is a light grade, and 0.74 is termed stove gasoline from its general use for heating. The analysis of the 0.71 gravity gives carbon 838; hydrogen, 155; impurities, seven in 1,000 parts with a heating value of about 18,000 B.t.u. per pound. The variation of the gravity of gasoline is due to the variation in the percentage of hydrogen. The vapor of gasoline is equal to 160 cubic feet per gallon, or about 1,200 times its liquid bulk. A saturated air gas of equal parts air and vapor equals 320 cubic feet per gallon of liquid. It is non-explosive in itself, and when mixed with air is used as an explosive power in gasoline and automobile engines. The boiling point of gasoline such as is used for explosive engines, ranged from 150° to 180° F., and the flashing point of the liquid ranges from 10° F., with complete combustion of the vapor. The vapor of gasoline from one pound of the liquid required 189 cubic feet of air and as one pound is equal to 26 cubic feet of vapor, 189/26=

This department will supply information on problems arising in every department of the gas industry. Your co-operation is solicited, both in asking and answering questions. Address: W. M. Henderson, Pacific Gas & Electric Co., 445 Sutter St., San Francisco, Calif.

NEW QUESTIONS.

249—Sewer Gas.

From time to time we have had complaints from the Board of Works that gas is leaking from our distribution system into the sewers. There have been two explosions recently in manholes, not serious, but it has brought the subject to a head. Is it possible to be manufactured gas, and how does it get in the sewer? What else could it be? What ignites the gas and is there a preventive?

250—Eutectics.

Can you define for me what the term "eutectics" means in speaking of a lead-tin alloy, solder or a combination of such metals as antimony, copper, zinc, etc.?

251—Combustion Products.

Would the products of combustion entering a room be unhealthy; from a luminous flame, from a non-luminous flame?

Nathaniel Tufts Meter Works

455 Commercial Street

Boston

Established 1860

In New England there are ONE MILLION consumers GAS METERS.

35% or 350,000 are of the *Prepayment Type*

39% of our total meters sold in 1916 were *Prepayment*

We manufacture these under License from John J. Griffin & Company

McDONALD METERS

Noted for Accuracy

CONSUMERS METERS
REGULAR AND B TYPE

PREPAYMENT METERS
ADAPTED TO ALL REQUIREMENTS

STATION METER WORK
OF EVERY DESCRIPTION *with* A SPECIALTY *of*
THE HINMAN MEASURING DRUM

D. McDONALD & COMPANY

991 BROADWAY, ALBANY, NEW YORK

The MARYLAND METER

B. METERS

FOR INCREASED CAPACITY
UNDER SLOW SPEED OPERATION

STATION METERS
METER PROVERS, COMPLAINT METERS, ETC.

ARTIFICIAL AND NATURAL GAS METERS
PREPAYMENT METERS

MARYLAND METER WORKS

BALTIMORE, MARYLAND

SPECIAL ATTENTION TO REPAIR WORK

NORTHWEST REPRESENTATIVES: NORTHWEST GAS EQUIPMENT CO.
1010 SPALDING BUILDING, PORTLAND, ORE.

NEW YORK PHILADELPHIA CHICAGO

AMERICAN METER COMPANY

Incorporated

Established 1834

LARGE DIAL DEMONSTRATION DRY METER

For the purpose of demonstrating the economical consumption of gas stoves, burners and industrial gas appliances this meter is very well adapted.

The meter is furnished with a dial for double reading; the inner circle of dial registers 1 cubic foot per revolution and is divided into 100 parts; the outer circle indicates directly the hourly rate of consumption up to 60 cubic feet for one minute observations.

CIRCULARS SENT ON REQUEST

Our apparatus at the Collective Gas Exhibit at the Panama-Pacific International Exposition was awarded the Grand Prize.

AMERICAN METER COMPANY

Incorporated

11TH AVE. AND 47TH ST., NEW YORK CITY

7.3, so that one part of gasoline vapor with 7.3 parts air may be used to produce a perfect combustion. Fewer parts of air will leave a residuum of unconsumed vapor, while an excess of air will lessen the intensity of the explosion, and if the excess is sufficient will prevent the explosion. Gasoline vapor has, when mixed with air, an explosion range from two parts air to one part of gasoline vapor up to 19 parts air to one part gasoline vapor, the intensity of the explosion varying with the mixture. The specific gravity of gasoline vapor is from 1½ to 2½ times that of air. It is colorless and has a penetrating odor.

244—Fire-Proofing Wood.

What application can be made to wood to make it resist fire?

A report of the Forest Products Laboratory on the fireproofing of wood gave as the result of their investigating a brief statement of the results obtained. They found that the most efficient chemicals are those that sublime or decompose under heat. Incombustible gases are driven off and mix with the inflammable gases from the wood, rendering them non-inflammable.

The chemicals tried were divided into those that sublime, such as ammonium chloride and ammonium sulphate, and those that decompose under heat and give off incombustible gases, such as ammonium phosphate, sodium bicarbonate and oxalic acid. The results obtained to date in the experiment are·

(1) Ammonium salts are of considerable value in fireproofing wood, it being impossible to ignite wood, under the test conditions, that had been treated with these salts.

(2) Borax is of considerable value, although not of the value of the ammonia salts. It, however, promises a means of lessening the cost of treating by using it with another salt of greater value.

(3) It appears possible to devise a reasonable inexpensive method of rendering wood fire retarding.

(4) Of eight untreated species of wood tested, tamarack is the most fire resistant. Redwood comes next, even though Western larch and noble fir were slow to ignite.

245—Graphite.

Is graphite, used as a refractory material, produced artificially or is it found in the natural state?

Graphite is an allotropic form of carbon. Two kinds are recognized—"amorphous" and "crystalline." It is only the latter that is of importance as a refractory material. The former is used chiefly for paints, lead pencils, stove polishes, etc. The finest grades of crystalline graphite come from the island of Ceylon, although very fine grades are obtained from Siberia, Canada, and certain portions of the United States. Selected specimens of Ceylon graphite will contain from 99.7 to 99.8 per cent. of carbon but generally the amount ranges from 70 to 90 per cent. Here is a typical analysis.

	Per Cent.
Carbon	86.66
Insoluble silica	4.22
Soluble silica	4.05
Allumina and ferric oxide	4.66
Lime and magnesia	1.01

The soluble silica and iron oxide determine its quality, since these substances lower its refractoriness.

Graphite can be prepared artificially by the Acheson process, in which anthracite coal, coke, or other forms of amorphous carbon are heated in the electric furnace in a reducing atmosphere, and then allowed to cool slowly. That used as a refractory is generally prepared from anthracite.

Graphite is used largely for making crucibles. For this purpose, it is necessary to mix with it a certain amount of good fire clay, since graphite is not plastic. The amount of clay used varies from 50 to 75 per cent., depending upon the grade of the crucible.

Graphite is the most refractory material known. It has not been fused, although it softens somewhat and vaporizes at the temperature of the electric arc about 3,700 deg. C. As a refractory material, it can be used only under reducing conditions; it burns when under the influence of oxidizing flames and oxidizing fluxes.

REPEATED QUESTIONS.

237—Water Heater Campaign.

What experience have gas companies had with direct mailing campaigns for the sale of automatic gas water heaters? What success? Were letters used or mailing cards and if so were these pieces mailed under regular postage covers or were they delivered by gas company employes?

238—Connecting Water Heaters.

What is the usual charge for connecting a No. 65 Pittsburg, a No. 4, 6 and 8 Ruud, Humphrey or Pittsburg? Are installations made with a view of making profit on installation work as well as heaters or on heaters only?

239—Labor Installing Heaters.

How many men would it require to install a No. 4 automatic gas water heater and how long on average reheating job? How long on average direct job?

240—Sale of Water Heaters.

What experience have gas companies in large cities had with direct mailing campaigns that were not coupled up with newspaper advertising? Could success be expected from campaigns consisting of mailing pieces only, with no newspaper advertising and no special window displays or store demonstrations?

241—Results of Heater Campaign.

What per cent. of automatic gas water heater sales are made by direct canvass; by customers calling at office; by prospects secured by mailing literature?

242—Automatic Heater Sales.

Do you believe that the average buyer of automatic gas water heaters can be reached by a house to house canvass?

243—Price Water Heaters.

What is the usual charge for automatic gas water heaters, list or list plus a fixed installation charge?

246—Reinforced Concrete.

Will not iron imbedded in concrete corrode?

247—Metal Cleaning.

Have you any suggestions for cleaning grease from metal surfaces?

248—Cements.

Some place, sometime, I have seen a list of various cements for different purposes. Can you refer me to where I can get a copy of same?

Walker Successfully Headed Texas Gas Association.

M. T. Walker, retiring president of the Texas Gas Association, is manager of the Beaumont Gas Light Co., one of

M. T. Walker, Baumont, Tex.

the successful public utilities of the southwest. Mr. Walker's administration of the Texas association's affairs during his term of office was eminently successful and the flourishing outlook for the organization is largely due to his personal interest and activities in its behalf.

Howard F. Hemenway, superintendent of the Westboro (Mass.) Gas & Electric Co., has resigned to accept a position in the electrical department of the government arsenal at Springfield.

William Jones, formerly superintendent of the Wisconsin Traction, Light, Heat & Power Co. at Appleton, Wis., has resigned and is now with the Michigan Light Co., Bay City, Mich., as superintendent of manufacture.

Light Oil Recovery from Gas

Results of Investigations of 43 Benzol Plants Given in Paper Prepared for the American Gas Institute—Specifications for Wash Oil

By W. H. Wright

Valuable information for gas companies on the recovery of light oil from by-product coke oven gas is contained in a paper prepared for the American Gas Institute by W. H. Wright from which the following brief abstract is made:

For the purpose of this article, information was sought from 43 benzol plants in this country. The light oil recovered at these plants show the following composition ranges:

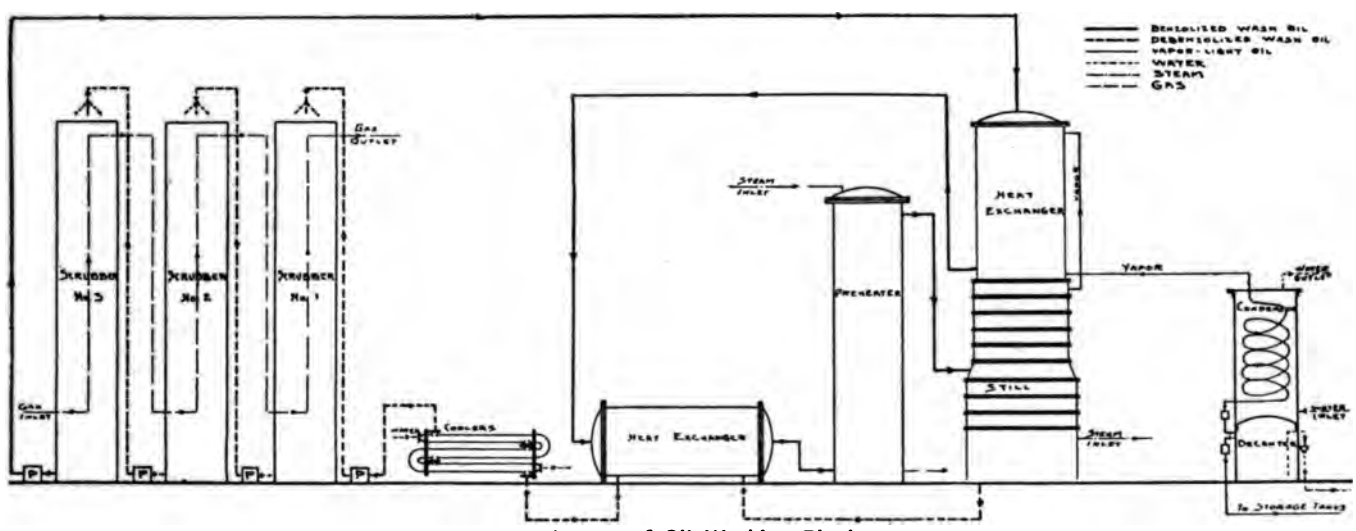
Light Oil Recovered.

First drop distilling over at 72-80°			Name of fraction	True boiling point of principal constituent	
55-75%	distilling	up to 100°C.	Crude benzol		80.2°C.
5-18%	"	from 100-120°C.	Crude toluol		110.0°C
2-11%	"	" 120-160°C.	Crude light Solvent Naphtha	Meta-xylol Para-xylol Ortha-xylol	137.5°C. 139.3°C. 142.6°C
1- 7%	"	" 160-200°C	Crude heavy Solvent Naphtha	Mixed higher member of the series.	

Wash Oil.

In Europe heavy tar oils have uniformly been used as absorbent, whereas in this country the industry has uniformly adopted the use of high boiling petroleum oils. The oil used is known to the trade as straw oil or spindle oil. It was initially sought to purchase it upon specifications which were quite rigid in their terms. it was found, however, that the oil refiners were unwilling to comply with all of these terms and that the oil which they could supply under the above trade names served the desired purpose very well. This oil is now supplied by various refiners under the name of absorbing oil. Five sets of wash oil specifications have been obtained and are given in appendix "B," in order to show their relationship. While the various statements of the requirements differ in their terms they do not really vary materially in substance.

It is important that this oil should not show more than five per cent distilling over at 280° C.; that it should comply with the emulsification test given in the appendix and that its maximum absorption power should be tested up to about 14 per cent. The oil in circulation in the system should be tested from time to time for this latter point. This may be done by allowing the unscrubbed gas to bubble through a large sample in a wash bottle until small samples taken from it show no increase in light oil content. There is thus far no uniform practice in the matter of discarding or replacing the wash oil. Some plants discard only the boiler still residue obtained in the subsequent treatment of the light oil and replace wash oil only as this and other losses make it necessary. At other plants a regular routine of wash oil renewal is followed. In one case reported on, this routine provided for complete renewal every three months. The discarded wash oil is used direct as fuel oil or sold as such. At two plants where tar is used as fuel in the steel mills the rejected wash oil is mixed directly with it. The wash oil gradually accumulates a thick muck in most operations which reduces its absorbent power and also makes it difficult to handle, especially in cold weather. Ample provisions should be made in the design of the plant for the removal of this muck. Where still temperatures are not high it will contain a high proportion of naphthaline and it will in this case accumulate very rapidly. Supercentrifuges have been used to good advantage for separating this muck from the oil. How-



Iagram of Oil Washing Plant

ever, where a reasonable turnover can be made on the original cost of wash oil in selling it, it is better to run at the rate that will keep the plant clear of all muck troubles. This is especially true at the present prices for benzol products. High distillation temperatures are, as indicated, essential in order to obtain the greatest freedom from the deterioration of wash oil due to loss of absorbing power and accumulation of muck. Plants at which still temperatures of around 135° C. are obtained show better wash oil results than plants distilling at lower temperatures.

Contact With Wash Oil.

The benzol scrubbers in use in the various plants reporting are of such size as to give a velocity of from 1½ to 4 feet per second when figuring that one-half of the gross area of the scrubbers is available for gas flow, and the time of contact of the gas with the oil of from 40 to 160 seconds. The gas and wash oil temperatures, as effecting the permissible saturation of the wash oil, and the length of travel through the oil wetted hurdles, as determining the total time of contact between the gas and oil are the principle factors bearing upon this point. One plant shows a contact of only 20 seconds. This is an abnormal case, however, in that the temperature of the scrubbers is down to 12° C. as against temperatures at other plants ranging from 18 to 25° C. The contact in the majority of plants runs from 70 to 100 seconds. The absorbing power of the wash oil starts to drop off very rapidly at about 25° C. It is, therefore, important to maintain the temperature of the gas and wash oil at or below this point in order to insure good efficiency. The light oil remaining in the gas at favorable temperatures has about the composition of the wash oil recovered. When the scrubber efficiency goes down due to high temperatures the unrecovered light oil is found to run higher in the fractions constituting the lower end of the distillation range of the normal light oil.

Quantity of Light Oil.

The reports received indicate that coke oven gas will normally carry from 0.17 to 0.37 gallon of light oil per 1,000 cubic feet. This can normally be reduced in the scrubbers to 0.02 to 0.03 gallon per 1,000, although some plants are reducing it to as low as 0.01 gallon. In general the amount of light oil will vary in proportion to the volatile matter of the coal used. Any statement as to the effect of the carbonizing temperatures upon the yield or composition of the light oil should be made with a good deal of caution. There is a general agreement, based upon fully established fact, that excessively high carbonizing temperatures tend to reduce the quantity of light oil and also to decrease the amount of toluol and increase the amount of benzol in the light oil produced. This is entirely in accordance with the theory that the higher members of the series are the immediate products of the process of destructive distillation and that these higher members are cracked down into the lower members by the subsequent heating of these products. While the above statements are unquestionably true as applying to the question in general, it does not necessarily follow that they may apply to each specific plant. It would consequently seem wise to determine this point, for each operation, within the carbonizing temperature range allowed by other considerations. The writer has in mind one coke plant operating on a 19 to 20-hour coking time at which the heat in the tops of the ovens are especially low, relative to that of the plants of the oven wall area. At this plant the toluol fraction in the light oil is increased and the benzol fraction thereby relatively decreased by carrying the highest temperatures consistent with producing satisfactory coke.

Effect on Candle Power.

The gas man is vitally interested in this subject of light oil removal in the effect which it has upon the candle-power and heat value of the gas and also in the effect which it may have upon its further distribution. As the overwhelming majority of the coke plants recovering benzol are not supplying illuminating gas, there is not available a wide range of information upon all of these subjects. The reports received indicate that for practical purposes the reduction in heat value may be placed at 10 B. t. u. and the reduction in candle-power at 2.3 candles for each 0.1 gallon of light oil removed per 1,000. The further loss of these two properties in distributing the gas will be very much less than when distributing the gas as normally produced. It becomes, in fact, negligible. This is, of course, due to the fact that practically all of the heat value and candle-power loss in normal distribution is due to the condensing out of the benzol series which go off as drip oils. This same statement will also apply largely where the toluol and solvent naphtha fractions only are retained and the benzol proper is used to enrich the gas.

Naphthaline Content.

The naphthaline content of the gas will be reduced in the scrubbers to an entirely negligible point along with the benzol if a sufficient high distillation temperature is maintained. When this is not the case the wash oil may gradually accumulate naphthaline to such an extent as to become saturated and thus cease to take up further quantities from the gas. A rather unexpected condition has been observed when distributing gas through an old distribution system contaminated by naphthaline, from which all of the naphthaline has been removed. The initiation of such distribution is shortly followed by the occurrence of numerous naphthaline stoppages in the services and in the mains in outlying districts. This appears to be due to the fact that the gas coming from the plant entirely free from naphthaline takes it up in the holder and at all near lying points in the distribution system bringing about an entire redistribution of these deposits by depositing a portion of it again at outlying points. This naphthaline is deposited as the gas is cooled toward the minimum temperature in the distribution system and reaches and passes the dew point for the quantity of naphthaline which it has taken up and carries. When this same thing occurs when distributing unscrubbed gas the naphthaline will be accompanied at its point of condensation by drip oil which will hold it in solution. This applies especially to the xylol and the solvent naphtha fractions, as the dew point of these oils is very close to that of naphthaline. This insures their coming down as the naphthaline does. These oils will hold the naphthaline and carry it in solution to a drip. As these oils are entirely lacking in the scrubbed gas the naphthaline which comes down in the solid state will remain in that state and gradually gather in sufficient quantity to constitute stoppage. A large proportion of the naphthaline picked up by the scrubbed gas is, no doubt, carried out of the system through the burners and the system will gradually clean up to the entire elimination of naphthaline troubles. Mobilization of the naphthaline throughout the system and its elimination, as manifested by stoppages due to this cause drop off to an ultimate entire elimination.

Appendix "B."

Wash Oil Specifications.

1. Specific gravity—
(A) Not over 0.875 at 18° C.
(B) Not over 0.88 at 15° C.
(C) Must be under 0.88 at 15.5° C.
(D) Not over 0.88 at 18° C.
(E) No specification.
2. Distillation test—steam—
(A) Five hundred cubic centimeters of wash oil when steam distilled at 100° C. should not yield more than 10 cubic centimeters of distillate when dis-

tilled with 0.5 kilo. of steam. No direct flame to be used on still.

(B) Steam distillation of wash oil as in (A) should produce no permanent emulsion. After 15 minutes, there should be no band of emulsified oil between oil and water. The line of division should be sharply defined.

(C) Less than 2 per cent distillate when distilled with 0.5 kilo of steam.

(D) No specification.

(E) No specification.

3. Distillation test—dry—

(A) First drop—not under 240° C. 5 per cent.—not under 270° C. 90 per cent.—should distill within 100° C.

(B) No distillate under 275° C. Temperature of oil.

(C) No distillate under 280° C.

(D) No distillate under 285° C.

(E) 90 per cent. must distill between 250° C. and 370° C.

4. Cooling test.

(A) Must not thicken upon cooling to 4° C.

(B) Must not thicken or become cloudy upon cooling to 4° C.

(C) No specification.

(D) No specification.

(E) No specification.

5. Emulsification test.

(A) When 100 cubic centimeters of wash oil is shaken vigorously in a stoppered 200 cubic centimeter cylinder with 100 cubic centimeters of water, separation should take place as quickly as possible and at least 95 per cent. should separate in 10 minutes.

(B) When 100 cubic centimeters of wash oil is shaken for 10 seconds in a stoppered 200 cubic centimeter cylinder with 100 cubic centimeters of water, 95 per cent. of water should separate in 10 minutes.

(C) When 100 cubic centimeters of wash oil is shaken in a stoppered 200 cubic centimeter cylinder with 100 cubic centimeters of water, 95 per cent. of water should separate in 10 minutes.

(D) 95 per cent. in 5 minutes.

(E) No specification.

6 Viscosity test.

(A) Not over 92 seconds at 21° C. when using Saybolt viscosimeter.

(B) No specification.

(C) No specification.

(D) No specification.

(E) No specification.

7. Olefins test.

(A) Should not lose more than 10 per cent. of volume when washed with two and one-half times its volume with a mixture of two parts—93 sulphuric acid and one part fuming sulphuric containing about 25 per cent. free So3.

(B) Should be below 10 per cent.

(C) Not over 10 per cent.

(D) No specification.

(E) No specification.

Some Pertinent Facts About Paint.

As paint pigments, silica and flake graphite are absolutely unchangeable. Paints made with these pigments possess the greatest possible durability, films remaining elastic after years of service. No chemical action can occur between the pigment and the vehicle. Graphite is the most water-repellent pigment known, and paints made with it are the best water excluders, thus preventing corrosion. Because of the unctuous quality of the graphite, the paint is easily applied, thus insuring good work, and good work is as important as good paint.

Coke Prices Fixed

United States Fuel Administration Announces Maximum Selling Rates

United States Fuel Administrator H. A. Garfield has announced the prices for all grades of by-product, bee-hive and gas coke and these rates are now in effect. The official order as issued by W. S. Blauvelt, head of the coke division, is as follows:

It appearing to the United States fuel administrator that various regulations should be put in force at once for the better control of the distribution of by-product coke and of gas coke, and of the prices at which the same may be sold, the United States fuel administrator, acting under authority of an executive order of the President of the United States dated August 23, 1917, appointing said administrator, and in furtherance of the purpose of said order and of the Act of Congress therein referred to and approved August 10, 1917, hereby orders and directs as follows:

The price of coke shall be understood as the price per ton of 2,000 pounds, f. o. b. cars at the plant where the coke is manufactured.

All the maximum prices mentioned herein shall apply to car lots sold to consumers or to dealers for wagon delivery; any commissions paid to selling agencies, or margins allowed to jobbers, shall be paid by the vendors, and shall not be added to the price established hereby.

In all cases where wagon deliveries are made, either by the coke producer or by dealers, a reasonable charge for such handling and delivery may be made: such charge shall be subject to approval of the state fuel administrator.

By-Product Coke.

Except for by-product coke produced in New England, the maximum prices for each grade of by-product coke, f. o. b. cars at point of production, shall be the sum of the base price for the grade, and the freight rate from the competing bee-hive coke district which takes the lowest freight rate to the point where such by-product coke is produced. The base prices are as follows: Run of ovens, $6.00, selected foundry, $7.00, and crushed over one-inch size, $6.50.

Gas Coke.

The maximum price of gas coke sold for industrial or metallurgical use shall be fixed at the price established by the United States fuel administrator for the corresponding grade of coke produced in by-product ovens. The maximum price of gas coke sold for household purposes shall be the price established by the United States fuel administration for anthracite coal in the same locality. This order became effective 7 a. m., November 19, and will remain in effect until January 1, 1918, or until superseded by further order.

Bee Hive Coke.

The maximum prices for coke made in ovens, without by-product recovery, east of the Mississippi river, shall be as follows:

Blast furnace coke	$6.00
Foundry coke, 72-hour selected	7.00
Crushed coke, over one-inch size	7.30

The maximum prices for various grades of bee-hive coke made in districts other than that described heretofore shall bear the same ratio to the established price of the coal from which the coke is made as the average contract prices of the same grades of coke had to the average contract prices of coal during the years 1912 and 1913. This order became effective 7 a. m. November 10, 1917.

Sailors Guests of Honor at Gas Employes Meet.

The last meeting of the Gas Company Employes' Association of Pittsfield, Mass., was made notable by the presence of several of the men from the Charleston navy yard who were in the city in the interest of the sailors' relief fund for the needy families of the enlisted men. The meeting hall in the gas office building was appropriately decorated for the occasion with the national emblem and potted plants. A supper was served by the gas men. At the conclusion of the supper, Chief A. C. Jasperson, in charge of the local navy recruiting station, gave an interesting description of the makeup of a battleship and told of the many wonderful departments that were essential to the operation of the modern man-of-war. A discussion followed. Chief Jeffrey and a quartet were also present and gave a pleasing concert. A short talk was also given by Chief Jeffrey.

Doherty Gas Association Meets In Buffalo.

The Doherty Association of Canada and New York state, the organization of natural gas men in that part of the country, met at the Hotel Statler at Buffalo November 17. E. Wagner, assistant secretary and treasurer of the Dominion Natural Gas Co., talked on the "Treatment of the Public." Another feature of the program was an address by J. E. McKimmie, purchasing agent of the Dominion company, on the subject of "Warehouse System, Work Order Forms, Etc."

Benzol Wash Oils

Qualities Which Tar Oils Should Possess for Best Absorption Results

It is possible to obtain with the benzol absorption oils at present on the market the maximum yield of crude benzol, but this is only obtained by frequent addition of fresh oil to the oil in circulation, declares Lance Shuttleworth in a recent issue of the London "Gas World." The reason for an oil becoming inefficient in its benzol absorbing capacity is due to its increased consistency, brought about by the elimination of the lower boiling point compounds by the temperature in the crude still and by the facility with which it takes up tar fog in the absorbing apparatus. It is quite obvious, then, that benzol absorption, being practically a mechanical phenomenon, cannot be efficient where the absorbing medium flows down the scrubbing towers in limpid streams incapable of producing an oil saturated area.

It is found that a wash oil has the longest life in circulation at installations where there is (1) efficient tar extraction apparatus, and (2) efficient dephlegmation on the crude still, so as to condense the low-boiling oils volatilized.

Most coke oven installations have not the above advantages to the necessary degree, and it thus behooves benzol producers to formulate a specification, to which they most strictly adhere, which will allow of a wash oil to retain its benzol absorbing powers for a longer period.

It is generally found that oils distilling over below 230° C. are volatilized in the crude still, giving additional work to the primary condenser. The percentage of these oils, generally termed naphthalene oil, should be as small as possible. Also, as the boiling point of tar oils increases with the consistency, and compounds boiling above 300° C. are of a heavy nature, the percentage of these compounds should be as small as possible.

It cannot be too strongly emphasized that the whole question of benzol absorption by tar oils rests almost entirely if not absolutely on their consistency. Laboratory tests have been made using "spent oil" as a washing medium; and, given efficient scrubbing by suitable laboratory apparatus, this oil absorbs benzol equally as well as fresh creosote oil.

An oil suitably adapted for benzol absorption must, when tested, have the bulk distilling between 230° C. and 300° C. This range does not necessarily give an oil of super-absorption powers, but in the working of the scrubbing plant and crude still there are factors present which absolutely demand it.

By double distillation this oil can be produced, and, although initially costing more, its increased life in circulation and its uniform absorption of benzol in the scrubbers would amply repay benzol producers for its adoption. At works where rotary washers are used as scrubbing plant a clean cut anthracene oil can be used with success, as in this type of scrubber consistency is not so vitally important, although it still remains an appreciable factor.

The writer has no works' experience in the use of petroleum oils as benzol absorbents, but he understands they are being used. From laboratory tests petroleum oils are equally as efficient as coal tar oils, but their greater cost would necessitate a longer life in circulation, which would be doubtfully obtained if their absorption of tar fog is equal to tar oils. When tar fog is entirely eliminated there are reasons to believe that petroleum oils will become the generally used benzol absorbents.

It is necessary at plants where benzol extraction is carried on to make estimations of the percentage benzol extraction from the gas. Most erecting firms guarantee a minimum of 90 per cent. in this respect. To estimate the quantity of benzol in the gas before and after scrubbers many absorbing mediums are used, among which creosote oil predominates in favor. The writer has obtained inconsistent and sometimes absurd results with this medium, and has discarded it in favor of olive oil. The analysis carried out with olive oil becomes an almost mechanical process, as the benzol is finally estimated by steam distillation.

Using creosote oil, a variation in the distillation invariably occurs. Draughts, intensity of flame heat, and type of distilling flask go to make the test quite unreliable. At the same time it is quite impossible to say at what temperature the distillation is concluded.

The quality of petroleum oil known as "Spindle" oil has been found to answer equally as well as olive oil. Using this medium, steam distillation and direct distillation give identical results, as in the latter a distinct rapid rise in temperature occurs when all the benzol has been driven off.

The writer has obtained extremely good results using Dr. Seger's test for benzol estimation. In this the medium is white oil of petroleum having a specific gravity of 0.88 and a boiling point of 360° C. The gas is purified, before entering the petroleum oil, by caustic potash solution and sulphuric acid. Drying is effected by calcium chloride tubes. The oil is kept at 0° C. by a freezing mixture and the final estimation of benzol is obtained by weight.

The writer has tried estimations by weight with concentrated nitric acid, solvent naphtha, and a mixture of half creosote and half nitro-benzene, all with indifferent results. In his opinion, for a works' estimation of percentage benzol extraction there is no better absorbing medium than olive oil. For an accurate estimation of benzol contents in a gas Dr. Seger's test is undoubtedly the best at present known.

90% INCREASE.

Gas Oil That Much Higher Now On Pacific Coast Than Last Year.

The Pacific Gas and Electric Co. has filed with the California commission an application for authority to increase its gas rates in all districts outside of San Francisco. The company has suffered a constant increase in the cost of all the material it uses in the production and distribution of gas. From 1911 to 1916, within which period the company's present rates were fixed, the company purchased oil under contract for 68½ cents per barrel, delivered at San Francisco bay points, with freight added to points in the interior. The price paid at present is approximately $1.35 per barrel. In the districts outside of San Francisco there will be required during the next twelve months more than 893,000 barrels of oil for gas making, which, with no further increase in oil prices, will cost approximately $1,246,000. Under prices paid between 1911 and 1916 this oil would have cost $654,000. This is an increase of $592,000, or more than 90 per cent. The commission recently allowed the company a graduated scale of rates for gas consumers in San Francisco, beginning with a rate of 85 cents per 1,000 cubic feet. This 85-cent rate is 10 cents higher than that previously established by the Board of Supervisors, an appeal from whose action has been on hearing before the United States District Court.

Allenbach Hunts With Automobile in Washington Mountains.

C. G. Allenbach, new business manager of the Spokane (Wash.) Gas & Fuel Co., recently took an automobile hunting trip through the mountainous part of Washington.

Additional Enlistments Needed For Gas and Flame Service.

The first battalion of American soldiers to meet offensively the gas and fire which the enemy introduced in warfare is being organized as the Thirtieth Engineers, Gas and Flame, with headquarters at Camp American University, Washington, D. C. The battalion is being recruited from the ranks of such civil professions and trades as chemical and mechanical engineering, explosive and gas manufacture, plumbing and carpentry, and similar trades, and an exceptionally high grade of talent is volunteering.

Major E. J. Atkisson, corps of engineers, a graduate of West Point and of Cornell, is in charge of organization. He has specialized in mechanical and electric engineering, was formerly director of electrical and mechanical engineering, U. S. Army School, and was superintendent of locks, Panama Canal. A number of recent recruits have come into the battalion directly from the Panama Canal service.

Although the gas and flame service was authorized as recently as October 15th, rapid progress has been made in organization, due to its promise of early service at the front and on account of its appeal to men experienced in civil trades which lend immediate qualifications for this special work. It is announced that there is opportunity for a limited number of enlistments for the following classes of men: chemists, gas engineers, plumbers, electrical experts, pipe fitters, interpreters, mechanics, chauffeurs, explosive experts, cooks, gas experts, blacksmiths, carpenters, clerks and muscular, quick-thinking, resolute men, between the ages of 18 and 40 years, for pioneer soldier service of high character. Major Atkisson has announced that any man possessing the necessary qualifications may volunteer at any recruiting station of the country by asking to join the Thirtieth Battalion Gas and Flame, forming at Washington.

The recruiting is entirely upon the volunteer basis, as it is the purpose of the war department to organize the body from highly qualified material. A number of chemists, electricians and mechanics, well-known in civil life, were first to respond to the call for this service. The recruiting service is requesting employers of men engaged in civil pursuits were suitable experience for gas and flame service has been obtained, to suggest this branch of service to those desiring to volunteer for special duty consistent with special training.

Lowering Gas Main

Intermediate Pressure Line Placed Below Grade at Omaha in One Day

By Joseph Lucena
Superintendent Distribution, Omaha Gas Co.

The eight-in. intermediate pressure main supplying gas to that section of Omaha known as Benson was exposed by grading operations for the construction of a new boulevard at 48th street between Seward and Decatur streets, making it necessary to lower the main for a distance of 450 feet. As no other supply line runs to Benson, a four-in. bypass was used. Four two-in. holes were made at each end of the job so as to furnish the proper facilities for cutting off the gas in the section of main to be lowered. The ditch was dug to the required depth (about seven feet at the maximum), leaving a bench of earth back of each bell to support the main until preparations were completed for lowering.

Fig. 1—Before Lowering the Main.

Everything being ready, including bell holes, a workman equipped with a self-rescue breathing apparatus, placed two stoppers, one in each of the two-in. bag holes, against the flow of gas. Vent pipes, consisting of 20-ft. lengths of two-in. pipe, were placed in the third two-in. holes, and two bags were placed in each of the last two-in. holes. This part of the work was undertaken the first thing in the morning, allowing a full day to lower the main. The pressure in the main varied from 20-in. to 50-in. water pressure, and the flow of gas in the section worked on was completely stopped, as described.

As soon as this was accomplished, a short piece of the main was cut from the center of the section with wheel cutters, plugs were placed in the open ends, and the lowering proceeded with in the regular way. The first joints at each end

Fig. 2—Showing Gas Main Stoppers.

were cut out and the earth gradually and evenly removed from the benches, allowing the main to settle to its new level. The south half was first lowered and graded with a level, followed by the lowering of the north half in the same manner. The main was reconnected and gas flow resumed the same day. The joints were of cement, faced with lead wool, and, after lowering, these were recalked and tested.

The methods pursued in this work were adopted for their obvious safety. Fig. 1 shows the main dug out before lowering. Fig. 2 shows stoppers, vent, bags and by-pass at south end of ditch. Fig. 3 shows south end lowered, with north end at old grade. Fig. 4 shows part of grading operation with earth on east edge of ditch. Fig. 5 shows the gang which did the job.

French Munition Plants for Dyes After the War.

A communication from the French Chamber of Commerce states that the munition plants will be turned over to the dye-makers at the conclusion of the war. In the past three years France has succeeded in turning out in large quantities and with many improvements articles for home consumption which before the war came entirely from across the Rhine, and the French did not believe they could manufacture. By the use of the munition plants these articles are to be placed in world competition after the war at prices that, says the Paris Chamber, will surprise foreigners.

Holton H. Scott, in general charge of the Doherty Syndicate's operations, is the father of a new heir. Another addition to the Doherty staff is reported by H. E. Brandli, general manager of the Meridian (Miss.) Light & Railway Co., who recently became the proud father of a nine pound boy.

SKILLED MEN WANTED.

Gas Men Among Those Needed For U. S. Signal Corps in France.

There is room on the ground behind the lines abroad for American gas men. The air fighters need the backing of skilled men to keep each airplane ready for instant and constant service, to bring up supplies, ammunition, food and clothing, without all of which the men in the air are useless, and to construct and maintain the air dromes for housing the planes and quartering the men. Squadrons have been and are now being formed for service abroad. Picked men are being enrolled from various classes of skilled workers and these men will be given special training, according to their vocations, in work required in the air service. They will get actual practice work on airplane motors, trucks, air drome construction, and everything that will be done on the other side. Non-commissioned officers will be chosen from among them. The air service calls for the following skilled workers, arranged in the order of number: Chauffeurs, auto mechanicians, automobile engine repair men, office clerks, carpenters, radio operators, electricians, instrument repair men, cooks, coppersmiths, armorers (machine gun repair men), sail makers, photographers, machinists, blacksmiths, motorcycle repair men, stenographers, cabinet makers, draftsmen (mechanical), magneto repair men, metal workers, automobile engine testers, rope riggers (cordage workers), propeller makers, riggers (airplane assemblers), telephone linemen, tool makers, vulcanizers, welders, lithographers, packers, telephone operators, motorcyclists, plumbers, painters, gas works employes, tailors, buglers, molders, pattern makers, telephone adjusters, barbers, truck masters, bricklayers, cobblers, propeller testers, boat makers and saddlers. Applicants must be physically sound, white, and from 18 to 40 years of age. They should mail the application as follows:

Volunteer Bureau, 119 D Street, N. E., Washington, D. C.

I desire to enlist, as a skilled workman, in the Aviation Section of the Signal Corps.

Name .....

Address .....

.....

.....

At present employed with.....

.....

.....

Trade .....

Number of years in trade.....

If you will be called by draft, when?

.....

.....

Fig. 3—Part of Main Lowered.

Fig. 4—Gang Which Did the Work.

The hotel department of the Detroit City Gas Co. is well represented in the various military and naval organizations. Mr. McVicar, who was hotel and restaurant salesman of the eastern district for three years, went with the navy at the outbreak of the war and was detailed to the battleship Iowa, later being transferred to the Kansas and is now on the Pennsylvania, which is the largest battleship afloat. He has been made quartermaster. Frank Vincent, formerly inside man of the department, has just been promoted to corporal at Camp Custer. Carl Frisk, who was assistant with McVicar, is with the ambulance corps as a driver. John J. Groff, chief clerk under Mr. Kratzer in the new business department, is at Camp Custer and has been promoted to sergeant. Several other members of the organization are with military branches of the service.

Frederick H. Treat, president of the New Jersey Gas Co., of Philadelphia, Pa., died recently.

Benzol Recovery

British Coke Ovens System for Extracting and Distilling Light Oil

While all systems for the treatment of crude benzol recovered on coke ovens are generally similar both in principle and in detail, there are often differences in working methods, and in the precise form or disposition of the plant employed, declares a recent issue of the London "Gas World," in describing the British Coke Ovens system for benzol recovery and refining. The system is a triple one, carrying the process of treatment to the stage of commercially pure products, which is becoming more and more the practice on British coking plants.

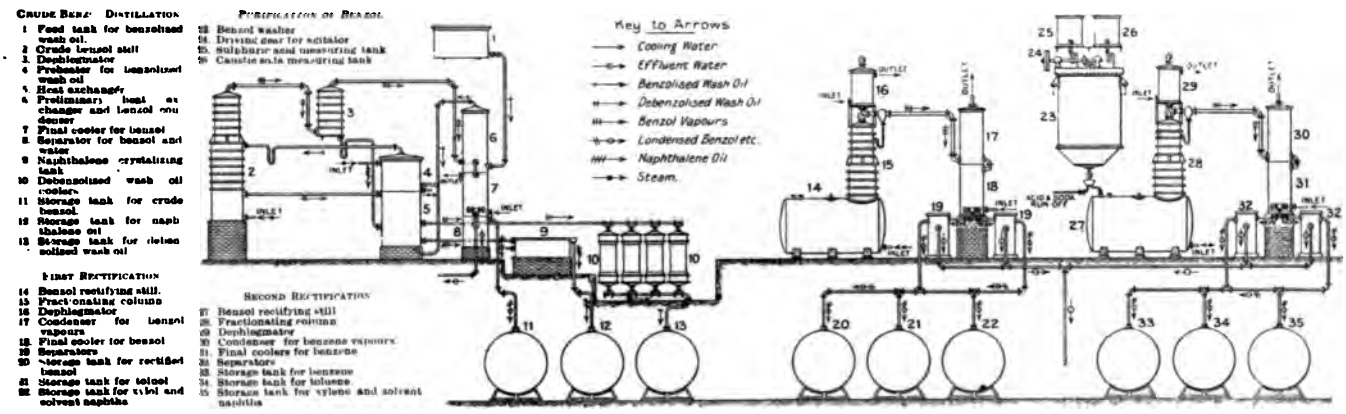


Diagram of British Coke Ovens System for Benzol Recovery and Refining

It may be mentioned also that the company has its own distinctive type and arrangement of benzol scrubbers; the characteristic feature being that one tower of 60 feet or so in height consists of two entirely separate scrubbers, one imposed upon the other, with a baffle plate partition, and each being independently served with absorbing oil.

"Too much importance should not be attached to the composition of the scrubbing oil; far more depends upon the human element in keeping the oil in the best condition for the work it has to perform;" and "it is essential that the dehydration of the scrubbing oil should be carried through completely in the benzol still, and that the gases entering the scrubbers should be as dry as possible." Stress is also laid upon the need of provision in the crude distilling plant for the removal of excess naphthalene from the circulating oil, so as to keep up its scrubbing efficiency.

The benzolized oil from the scrubbers is pumped into the feed tank (1) and conducted to the preliminary heat exchanger (6), which receives also the condensing benzol vapors from the crude still (2). The oil then passes to a second heat exchanger (5), which also receives the naphthalene oil from the dephlegmator (3). At about 130° C. the benzolized oil passes from the steam-heated preheater (4) to the still (2). Here the benzol, toluol and water are given off, while the oil with its content of xylol, solvent naphtha and naphthalene leaves the lower part of the still in contra-flow to the live steam. By the action of the steam these last-mentioned elements are driven off, rise through the upper half of the still, and with the benzol, toluol and water vapors pass on to the dephlegmator. In the dephlegmator the naphthalene separates out and finds its way via the heat exchanger (5) and crystallizing tank (9) to the storage tank (12); while the benzol vapors, leaving the top of the dephlegmator at a temperature of about 104°, go to the preliminary heat exchanger and benzol condenser (6) and final water cooler (7), and thence by way of the separator (8) to the storage tank (11). Meanwhile the debenzolized oil, leaving the bottom of the still (2), passes through the heat exchanger (5) and then to the water coolers (10) and storage tank (13), whence it again goes to the scrubbers.

For the first rectification the crude benzol is pumped from the storage tank (11) to the rectifying still (14). The still is heated by internal steam coils, and live steam is injected for the separation of the higher boiling products. The vapors pass through the fractionating column (15) and water-cooled dephlegmator (16) to the condenser (17) and final cooler (18), and the condensed products into either of the two separators (19), and finally to their respective storage tanks. For purification they are then pumped to the washer (23), which is provided with a mechanical agitator; acid and caustic soda are supplied from the vessels above (25) and (26); and after a final washing with water the respective products are further distilled and treated in the remainder of the apparatus for the commercially pure products desired.

Announcement has been made from the general offices of the Mohawk Gas Co. and the Schenectady Illuminating Co. that L. E. Cass, who since 1911 has been the purchasing agent for the company, has been promoted to take general charge of the sales departments of the two companies to take effect at once. Mr. Cass assumes the two positions made vacant by E. M. Ellsworth, head of the illuminating department sales, who resigns, and E. C. Van Deusen, head of the gas sales, who left for Camp Devens, Ayer, Mass., with the third contingent of Schenectady's draft quota.

John R. Strain, sales manager for the Hale & Kilburn range department, announces the retirement of the firm and himself from the gas field. Mr. Strain will continue with Hale & Kilburn in their automobile department. His many friends in the industry will be pleased to learn that he has also become interested in the New England Slag Co., as president and part owner. This is a new enterprise organized to supply roofing material to manufacturers from the steel mill slag piles of New England.

Bureau of Mines Year Book

Discusses Fuels—Gas from Lignite—Coal-Burning Equipment—Coke for Domestic Purposes—Nitration of Water Gas Toluene

The Yearbook of the Bureau of Mines for 1916 has just been issued. In it will be found a great deal of valuable information concerning the uses of various kinds of coal that will prove useful to gas men.

Looked at in a broad way, says the report, it is not economical to transport high-grade coal through long distances into districts where fuels of lesser value are to be had in abundance, when, as a matter of fact, the cheaper fuels could be satisfactorily used if the user would show a little patience and ingenuity. The suitability of fuels for use in any locality is therefore a matter of public education in which the Bureau of Mines takes a deep interest. As an illustration, the substitution of coke for anthracite coal in many localities is desirable on the score of economy, and the bureau desires to stimulate the use of coke as a domestic fuel because of its cleanliness. The bureau is also endeavoring to stimulate the use of coal gas, another form of smokeless fuel, instead of water gas, because during the past year some 20,000,000 barrels of petroleum was required to enrich the water gas used. The price of petroleum has so increased and the demands on our petroleum resources are so great as to make the use of this product undesirable for services that can be performed by other fuels.

Coal Burning Equipment Is Not Up-to-Date.

The variety of coal-burning equipment now existing is the result of ill-advised experimentation rather than rational design, according to the Bureau's findings, and the engineer has been unable to find quantitative figures that would enable him to design a furnace for a given fuel with the same assurance of success that he has in the design of a bridge or other structure. Studies of this intimate kind are usually beyond the possibility of private investigation, but are believed to be most essential to the efficient use of the fuel resources of the country. The attempt to decrease the cost of power has led to the development of internal-combustion engines using either gas or liquid fuel, and these engines have a much higher efficiency than the usual steam engine. However, they also use a much more expensive fuel, so that their use is confined to certain relatively narrow fields. One characteristic of these engines is that their high efficiency varies through a relatively narrow range whether they are large units or small units, whereas the economy of the steam engine varies through a wide range, and the most efficient types have efficiencies comparable with those of many internal-combustion engines.

If the average price of coal at the place of consumption be assumed to be not less than $2 per ton, the total value of the coal consumed annually in the United States is considerably over $1,000,000,000.

Manufacture of Gas From Lignite Experiments.

Tests as to the production of gas from lignite have been made by several methods under a variety of conditions of temperature, time and other modifying factors. The lignites have been found to yield much gas, its quality and character varying, of course, with conditions of production. There is little doubt, however, that this gas can be used for many purposes such as for power, heat, and light. The power tests indicate that it can be successfully employed to drive gas engines and that in such western lignite regions as are without water power, power can be produced at such a low figure as to exert a marked influence in the development of a variety of industries dependent upon a cheap and abundant power.

The gas thus used would, of course, be in the nature of a by-product. There can be obtained about 10,000 cubic feet of this gas from a ton of dry lignite, and in the unpurified state it has a heating value of 300 to 400 British thermal units per cubic foot.

Investigation of the Nitration of Water-Gas Toluene.

An investigation of the nitration of water-gas toluene was undertaken by the Bureau in view of the rather prevalent impression that toluene obtained in the manufacture of water gas is unsuitable for the manufacture of trinitrotoluene, because of the presence in it of hydrocarbons of the aliphatic series whose removal cannot be effected by the usual methods of purification. It was further anticipated that a similar difficulty would be encountered in efforts to utilize toluene prepared by processes involving the cracking of petroleum. However, early in the course of the investigation it became apparent that aliphatic hydrocarbons, if present at all in any sample under investigation, were present in negligible amounts, as far as these affect nitration. Consequently, the investigation became a more general one, embracing the nitration of any good grade of toluene, and it was continued with the purpose of not only working out the conditions under which the best yield of trinitrotoluene could be obtained from the sample of toluene in hand, but also of developing a method that might be capable of successful industrial application to the nitration of any toluene of approximately the same degree of purity. The need of such an investigation was emphasized by the incompleteness of published details with respect to methods already applied successfully in the industries. The data available in the literature on the nitration of toluene, although valuable and suggestive, did not afford a satisfactory basis for comparing the merits of different manufacturing processes with respect to quantity and quality of yield of trinitrotoluene.

Investigation of various conditions affecting the nitration of the toluene and the yield of trinitrotoluene have resulted in the development of a method of nitration by which a good yield of high-grade trinitrotoluene is obtained. The results of the investigation are embodied in Technical Paper 146a of the Bureau.

Concerning the Use of Coke for Domestic Purposes.

In an investigation of the use of coke as a domestic fuel, information has been collected by the Bureau from coal-gas companies, from by-product coke companies, and from dealers handling domestic coke. Inspection trips have been made in the West and in the East. Coke manufacturers, fuel dealers, and householders have been interviewed concerning coke and its adaptability for household purposes. The information thus obtained has been prepared for publication. Briefly, the general conclusion is that coke makes an excellent fuel for residence heating when properly handled, and in many sections its use for this purpose is increasing rapidly. Within the past five years there has been a remarkable development in the domestic utilization of coke and during the winter of 1915-16 the demand for coke for household use far surpassed all previous records and exceeded the supply.

Iroquois Seeks To Acquire Erie County Gas Co.

The Iroquois Natural Gas Co., of Buffalo, has asked the Public Service Commission for permission to acquire $299,000 of the common capital stock of the Erie County Natural Gas Fuel Co.

NEW PRODUCTS

Thomas Electric Meters for Measuring Gas.

The measurement of gases differs from the measurement of any other commodity in that the volumetric space occupied by the standard quantity unit varies with the pressure and temperature conditions existing in the pipe lines. Before the Thomas meter was developed, the volume of a gas was measured by some form of volumetric meter. Its pressure and temperature also were observed. The volumetric readings were then reduced by computations or tables to some standard quantity units, such as cubic feet at 30 inches mercury pressure and 60° F. temperature.

The Thomas meter measures gas directly in these standard quantity units. No corrections whatever for pressure or temperature need be applied to its readings. It shows these results in the two useful forms—on a totalizing dial and on a graphic chart—and it shows them in the superintendent's office.

A circular which the manufacturer of this equipment recently sent out shows a Thomas meter installed in the plant of the Malden (Mass.) Gas Light Co. The illustration shows the meter housing located in a valve house in the line between the purifiers and holders as well as the recording panel in the superintendent's office. This installation measures the water gas before going into the storage holders while another meter of the same type measures the coal gas manufactured.

Complete details concerning this electric meter will be gladly furnished by the Cutler-Hammer Mfg. Co., Milwaukee, Wis.

Scientific Clothes Dryer Now on Market.

The Scientific clothes dryer is scheduled for a brisk business if the plans of its makers, the Scientific Heater Co., succeed. This company has co-operated with gas companies so well in pushing the sales of the Scientific Safety Garage Heater that its clothes dryer campaign will be watched with interest. The Scientific clothes dryer is said to fill the demand for this type of appliance and is able to show a convincing record in service. Full details of the appliance and the Scientific plan for selling it through gas companies will be sent by its makers, the Scientific Heater Co., Cleveland, O.

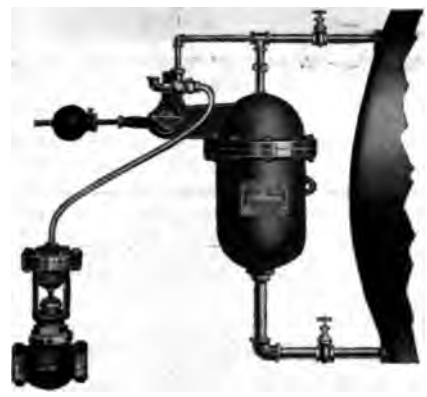
Price Book of Parts In Pittsburgh Heaters.

The 1917 price book of component parts of the Pittsburgh, Bungalow and Lion Water heaters has been issued by the Pittsburg Water Heater Co. These prices supersede all previous prices. This book also gives some excellent hints for maintaining water heaters in first class condition. A copy will be sent on request by the Pittsburg Water Heater Co., Pittsburgh, Pa.

Regulating Oil Level in Absorber Tanks.

In the process of manufacturing gasoline by absorbing the gasoline in oil and subsequently separating the gasoline from the oil by distillation, it is necessary to maintain a constant oil level in both the absorbing tank and the still.

For thus purpose the Vigilant oil level regulator has been placed on the market. It is declared that it will accommodate itself to any type of absorber or steam still and maintain a constant oil level under all conditions of temperature and pressure. The regulator is mounted on the side of the tank so that the center of the chamber is opposite to the oil level desired. One regulator will control the oil in any number of absorbers in battery. Further information concerning this device will be furnished by the manufacturer, the Chaplin-Fulton Mfg. Co., 28-34 Penn Ave., Pittsburgh.



Vigilant Oil Level Regulator

Auxiliary Gas Heater for Hot Water or Steam Plants.

A solution of the gas heating problem for most homes is proposed by the Detroit Heater Corporation, which recommends the installation of a Detroit heater as an auxiliary to a hot water or steam heating plant. It is said that the Detroit heater operating in this manner is economical enough to be attractive to any homestead. The Detroit heater is built of flange steel and tested to 50 lbs. pressure. The tubes and plates are autogenously welded into a one-piece heater. There are no solder, bolts nor threads to leak. The heater is rust proofed inside and out. The burner is formed of five bunsens made of cold drawn machined steel, also rust proofed. Full particulars of this new heater will be sent to new business managers by the Detroit Heater Corporation, Woodward Ave., and Adelaide St., Detroit.

Gas Oil Dealers Extend Their Facilities.

Anderson and Gustafson, of Chicago, who are well known in the gas industry on account of their dealings in gas oil and other petroleum products, have opened two more branch offices. One of the new offices is in the Hippodrome Bldg., Cleveland, and the other at Pittsburgh is in the Wabash Bldg. The activity in water gas plant construction has resulted in an increased demand for gas oil, which the Anderson and Gustafson organization is prepared to meet to the satisfaction of any gas company.

Two Kemp Machines in Hires' Can Factory.

The Hires Condensing Co., Port Dickinson, N. Y., is to install two 4,000 cu. ft. an hour Kemp system gas apparatus in its new plant in the suburbs of Binghamton, N. Y. The average consumption of the gas installation will be about 6,000 ft. an hour. The industrial business made it possible for the Binghamton Gas Works to extend its mains and serve domestic consumers in the village of Port Dickinson. One of the principal uses to which gas will be put in the Hires' installation will be in the manufacture of tin cans.

How Do You Figure on Cost of Paint?

Do you divide the years of service into the cost of paint, plus the cost of labor? If so, you have the correct method of figuring the yearly cost of paint protection, says the Joseph Dixon Crucible Co.

"If you have metal surfaces or any exposed surfaces, whether of metal or wood, to repaint, it will be worth your while to purchase Dixon's silica-graphite paint because the longer service and better quality of Dixon's paint are worth a great deal more than a few cents per gallon. The careful and cautious user of paint will appreciate this fact. For over fifty years the slogan and standard of the Dixon company in the matter of paint has been 'the best and one grade only.' If any one is looking for a low-priced paint and does not care about quality and long service, the Dixon company has nothing for him; but if he desires quality and long service, Dixon's silica-graphite paint is the best for him. We are ready at all times to give detailed information, price and assistance in any way."

Write the Joseph Dixon Crucible Co., Jersey City, N. J., and watch Dixon's house organ "Graphite" for long service records.

The Linde Air Products Co., 30 East Forty-second St., N. Y., has acquired a site at Norfolk, Va., and is planning for the erection of a new plant for the manufacture of oxygen and other air products for industrial service.

Pipe Corrosion in Pittsburgh Apartment Buildings.

"An Investigation of Pipe Corrosion" is the title of Bulletin 30, issued by the A. M. Byers Co., of Pittsburgh. The investigation was prompted by local agitation on the part of property owners who charged that chemicals were being used in the water filtration plants which destroyed the piping to such an extent that not even brass was immune. This subject was taken up by the Pittsburgh Board of Trade, and a report rendered which showed that no chemicals were used which could in any way be held responsible for the trouble, but the thought was expressed that the city should not be held responsible for the fact that much pipe of inferior quality had come into use in recent years.

In order to determine the life of pipe under varying conditions of service, Thomas F. Payne, a sanitary engineer, was commissioned by A. M. Byers Co. to make a house-to-house canvass of buildings, "with a view to ascertaining all the pertinent facts which might aid property owners in meeting the rust question in the most efficient manner." After several unsuccessful attempts to obtain accurate data from private residences and other buildings, it appeared that apartment buildings offered the best field for investigation, and 125 such buildings, all in Pittsburgh, were investigated. A tabular statement gives the name and location of each apartment building investigated, the year of its erection, the length of time which both hot and cold water lines of brass, steel and wrought iron had been in service where rusted out, and their present condition where still in service.

The investigation showed the corrosion to be most severe in hot water mains (exposed basement piping) and the recommendation is therefore made that pipe one size larger than that used in regular practice be used. The larger size, having a greater thickness and larger bore, would not so easily rust through or become stopped up with rust.

The hot water risers, which are usually concealed, proved to have a much longer life than the basement mains. It is therefore a question whether the practice of specifying brass pipe for risers, and iron or steel for mains, might not better be reversed. Brass pipe in this investigation did not show up as well as might be expected, and many complaints were heard on that account

Genuine wrought iron pipe, in sixty-five buildings, ranging in age from eight to twenty years, did not show a single failure when used for cold water supply, and in only one or two of these buildings did the wrought iron hot water risers require any repairs in the same period of time. Lead pipe, for hot water risers, seemed to have an average life of eighteen years, one complete failure being recorded after fourteen years' service.

It appeared from the investigation that the pipe lasted a little longer where an automatic water heater was used. This undoubtedly is due to the possibility of maintaining a lower temperature of the water than with a heater not having a thermostatic control, for corrosion increases with the temperature, reaching its maximum between 140° and 170° F. Temperatures from 115° to 130° F. are therefore to be recommended wherever they will serve the purpose.

The rusting out of pipes is one of the prolific sources of trouble for gas company superintendents and field men and they will welcome any research work on this subject. A copy of the complete report can be obtained from the A. M. Byers Co. by asking for Bulletin 30.

The "Windolite" One of Welsbach's Latest.

Bowl No. 1206, illustrated in the Welsbach Gas Co. Supplement recently issued, is an art glass bowl of the usual type, with a six-inch circular portion at the bottom of ripple cathedral glass, through

No. 1206—"Windolite" Bowl—Light Amber Art Glass.

which a stream of downward light passes directly to the table top or surface to be lighted. The more opaque portion protects the eyes from the direct light rays, and illuminates the ceiling and upper walls with all the soft, pleasing effect of semi-indirect illumination. In short, the "Windolite" bowl gives the downward illumination of direct lighting with all the eye comfort of a semi-indirect

No. 1532—Light Opal, With Scenic Decoration.

system. It contains the good points of both systems without disadvantages of either.

A number of new decorated bowls for semi-indirect fixtures are shown on page 6 of the Supplement. These range from light opal with Dresden decoration to scenic decorations in warm sunset tones and are supplied in fourteen and sixteen inch.

The Combustion Engineering Corp. is represented in the various branches of the national service insofar as its drafting room is concerned by six men who are enrolled as follows: Hugh Campbell, national army, Camp Upton; Robert Weber, naval reserves, Third district; Hubert Ahearn, naval militia, N. Y. Fifth Battalion; Murray Harris Nelson Hunter, British Royal Flying Corps; Raymond Zimber, U. S. A. Fly- (Corp.), O. E. R. C., Camp Upton; J. ing Corps, Mineola, L. I.

NEW RANGE LIGHTER.

Strause Gas Iron Co. Announces a New Appliance for Market In January.

One of the new gas appliances destined for permanent popularity with gas companies and range factories in all parts of America is the "Iwantu" gas range lighter, just now emerging from the process of being perfected in the factory of the Strause Gas Iron Co. of Philadelphia, and soon to be placed on the market alongside of the ever popular "Iwantu" gas iron. We understand the company has been subjecting its new lighter to all standard tests and that it has been found accurately designed and constructed in every particular and is positive in its action.

Its manufacturers claim that it has advantages not incorporated in any lighter now on the market and that it will stand any test given it by gas company laboratories. The appliance is due to be on the market, they state, in January or before and they further suggest that the gas appliance buyer see their product before placing orders.

When asked for a description of the lighter recently, Louis J. Strause, for the Strause Gas Iron Co., said:

"This new and useful appliance will be manufactured with the same skill and careful attention to detail as that which has made the 'Iwantu' iron so popular and in point of service and dependability will be on a par with that appliance. It is a one-flash lighter, one flash doing the service of the four flashes which are in use now. It only requires pointing the flame to the proper gas port to be lighted. It is less liable to breakage due to the fact that the extension pipe is very much shorter than lighters heretofore used, and an added and very important feature is that the simmering burner can be reached and lighted as well as any of the other burners."

Rex Ray Surface Combustion Installations.

Rathbone, Sard & Co. are conducting an advertising campaign in hotel trade papers that is expected to increase Rex-Ray surface combustion installations. Pictures of installations in well known hotels, clubs and restaurants are featured. Half pages are being used and a strong showing is made in the space. The purpose of this advertising is to help new business departments make more Rex Ray broiler installations. New business men will be sent proofs of the hotel paper advertisements to use in their solicitation, upon request of advertising department, Rathbone, Sard Co., Albany, N. Y.

Baltimore Gas Appliance & Mfg. Co. Adds New Building.

About seven years ago the Baltimore Gas Appliance & Manufacturing Co. began making gas ranges and heaters. The firm's development has continued until now, to meet increased demands, the company is erecting another building to house a new foundry.

ABOUT MEN YOU KNOW

Byllesby Commissioned a Major in U. S. Air Service.

H. M. Byllesby, president of the H. M. Byllesby Co., of Chicago, has been commissioned a major in the air service. Major Byllesby is to devote his time until ordered to France to the recruiting work of the air service. He

Major H. M. Byllesby.

was sought for this work by war department officials who made a canvass of the country for some man of big business to enliven the work. When summoned for the task Mr. Byllesby agreed to drop his extensive business interests and responded at once.

F. E. Newberry, who recently resigned as commercial manager of the New York & Richmond Gas Co., Staten Island, New York, now is manager of the Tulsa (Okla.) office of Geo. C. Peterson Co., Chicago oil jobbers.

T. J. WHALEN AT DETROIT.

Resigns at Jackson, Mich., and Will Engage in Consulting Gas Work.

T. J. Whalen, for many years superintendent of the gas plant at Jackson, Mich., has resigned to take effect December 1, after which he will move to Detroit and do consulting work. He will specialize with the smaller companies needing expert services in order to be brought up to the highest stage of modern efficiency. It is interesting to note in this connection that the present head of the Detroit Gas Company was at one time Mr. Whalen's assistant there and took his place when he left. Mr. Whalen, who is a graduate of Notre Dame University, entered the employ of the Detroit City Gas Co. in March, 1888, when I. C. Baxter was superintendent. His first work consisted of unloading brick to be used in the first water gas machines at Detroit. After helping to erect the machines Mr. Whalen was the first man to put the blast on and the first one to operate those machines. He also broke in the first water gas maker in that city and in the intervening years has developed many other pupils there and elsewhere. He ran the Detroit machines until the Fall of 1894 when he took charge of the Pintsch plant that had just been built at Detroit. It is said that Mr. Whalen was the first gas man to make pitch at Detroit. He has progressed with all of the advanced practices down to date, having been first, it is said, to make oil gas in clay retorts at Detroit and first to put natural gas through a water gas machine. Mr. Whalen's wide experience covers water gas, Pintsch gas, natural gas, oil gas and coal gas. In connection with the latter work the vice-president of one of the largest gas works builders in the United States said not long ago: "I consider T. J. Whalen one of the best coal gas men I know of. I have known him to increase results from supposedly down-and-out benches to the most surprising makes." In spite of his broad experience Mr. Whalen is by no means old in years, being not yet 49. But recently he gave a practical demonstration of his energy and ability when he was called as first aid to a plant in Michigan. This plant had reached the stage where several factories, including a large automobile establishment, had been compelled to shut down for lack of fuel. This was a very timely rescue and one which was quickly and thoroughly accomplished by Mr. Whalen. He also has reorganized the labor in the operation of gas plants in Michigan, Illinois and Indiana, and for the past three years has been consulting engineer for the Charlotte (Mich.) Gas Works, one of the neatest, best equipped and most prosperous small plants in Michigan. Mr. Whalen is considered by compe-

T. J. Whalen, Detroit.

tent judges one of the country's finest instructors in training men to operate water gas machines or coal gas benches. For many years he has been one of the prominent and popular members of the Michigan Gas Association and his many friends in this organization and elsewhere throughout the industry will wish heartily for his success in his new line of work.

Jos Carr, one of the best known gas range men of the South, now is Southern representative for Rathbone, Sard & Co., with his headquarters at Atlanta, Ga.

Ross W. Lynn, formerly in the water heater business with headquarters at Indianapolis, now is special gas representative in the Central West for Rathbone, Sard & Co. He will make his headquarters in Chicago.

Earl Broshar now is with the Public Service Co., at Ames, Ia.

NATURAL GAS DEVELOPMENTS

Kansas and Oklahoma Gas Properties.

The Doherty Organization is to purchase the American Pipe Line Co. and has received the consent of the United States Government to this purchase. The American Pipe Line Co. owns much acreage in Chautauqua county, and has a pipeline from the Kansas fields through Rogers and connecting with the lines of the Wichita Natural Gas Co. There is a flow of 60,000,000 cubic feet of gas daily in these fields at present, and the additional pipeline facilities will be helpful to the Wichita Natural Gas Co. and to the Kansas Natural Gas Co.

By January 1 the Kansas Natural Gas Co. hopes to be supplying 80,000,000 cubic feet of gas daily. Lines are being rearranged, and new lines constructed by this company and the improvements will result in giving a much better supply to Kansas City.

All the natural gas systems of the Doherty Organization will sell after January 1 about 200,000,000 cubic feet of natural gas a day.

For a time there was less gas in the Cushing field, but now the quantity has increased. At Drumright, Okla., the gasoline extraction plant is operating satisfactorily and has proven very profitable.

Enid Gas Company Reaches Its Maximum Gas Output.

On October 26 the Enid (Okla.) division of the Oklahoma Gas & Electric Co. reached its maximum daily sales, to wit: 4,317,730 cu. ft. of natural gas. It is anticipated, however, that the maximum daily output during the winter will be two million in excess of this figure.

Connellsville (Pa.) Gas Company Asks Increased Rates.

The Fayette County Gas Co., Connellsville, Pa., has filed with the Public Service Commission a new tariff of rates for the supply of natural gas, to become effective on December 1, 1917.

Natural Gas Plant To Be Built At Shetland, Can.

The Shetland (Ont., Can.) Gas Co., through its superintendent, M. Dobbyn, announces that it will construct a natural gas distribution system for that city.

Lawton (Okla.) Gas & Electric Co. Is Incorporated.

The Lawton (Okla.) Gas & Electric Co. has incorporated with a capital of $300,000. John C. Keys is one of the incorporators.

The Jeanette (Pa.) Oil & Gas Co. has been organized with $50,000 capital to develop oil and gas lands in Pleasant and Tyler Counties, W. Va. Incorporators: John W. Keltz, Henry Bozzan, R. M. Zimmerman, Jeanette; H. E. Marker and C. B. Hollingsworth, Greensburg, Pa.

TEXAS PIPE LINE.

575 Miles Required To Bring Gas From Oklahoma To Many Texas Cities.

The 575 miles of gas pipe mains which conduct natural gas to a dozen or more of cities and towns in Northern Texas make up a system of lines of comparatively recent formation, constructed and operated by the Lone Star Gas Co. The development began a few years ago following the discovery of gas at Petrolia, northeast of Wichita Falls, and has spread rapidly in assuming its present proportions. Among the first lines laid were those to Wichita Falls, Bowie, Alvord, Decatur and Fort Worth. Later, extensions were made to Dallas, Gainesville, Sherman, Denison and McKinney. Tap lines were run out to a dozen or more smaller towns such as Bridgeport, Sunset, Riverside, Arlington, Grand Prairie, Denton and Whitesboro.

The necessity of running a line into Oklahoma to tap the supply in the district north of the Healdton oil field arose within the last year, when it became evident that the supply from the Petrolia field was inadequate to meet the need of gas consumers throughout the system. Actual operations in the work of laying this line from Gainesville into Oklahoma were delayed until last June. E. A. McPherson & Co. of Fort Worth took the contract to construct the line, using pipe, couplers and bolts taken up from one of the two lines extending from Wichita Falls to Alvord. Dr. McPherson, the leading member of the firm of contractors, told members of the Dallas party on the occasion of their visit to the pipe line that it has cost him $100,000 more to build the line than he will get out of it. The contract price is $1,500,000. The Lone Star Gas Co. officials are also taking care of a great deal of extraordinary expense, not desiring to hold the contractor to the letter of the contract and force him to lose a large sum of money. The new sixteen-inch line from a point two miles south of Gainesville to the little town of Dixie, at the western end of the Healdton oil field, is fifty-two miles long. From Dixie to Fox a temporary line is being laid on the surface of the ground, the size of this line being eight inches in diameter for three-fourths of its length, and ten and twelve inches in diameter in its lower reaches where it joints the sixteen-inch pipe. The sixteen-inch pipe is laid in a trench twenty-two inches wide and about three feet deep in most places. On the twenty-two miles of the pipe between Gainesville and the Red River a considerable quantity of solid rock formation was encountered, making it necessary to "shoot" the rock—that is, use dynamite. Other sections of the pipe north of Red River are laid in sandy soil and in a formation known as packsand, which, when very dry, as it is now, is difficult to excavate.

Most interesting of all the work on this line is that at the Red River crossing. The location is the western end of Sivell's Bend, about twenty miles northwest of Gainesville. It is at the point in the river course known as White Bluffs. This name was used because of the rocky and white clay formation. These bluffs are on the south bank of the river and rise to a height of 300 feet above the river sand, almost perpendicularly. In laying the pipe line over and down these precipitous banks it was necessary at times to lay some portions of the line at an angle of 45 to 50 degrees.

While, as an engineering feat, the laying of this pipe line over the bluff is interesting, it is no more interesting and important than the laying of the lines across the river. Three separate ten-inch lines are laid across the river, the distance between each line and the one next to it being 100 feet. The gas will flow through all these lines at the same time, so that in case one of them becomes damaged or broken it will not cut off the supply of gas below. Gate valves are constructed at both ends of the river lines so that it will be possible to close any one of the lines for repairs without closing the others.

The shifting sands of the river bed and the force of flood currents have been fully taken into consideration in the laying of the lines across the river. The lines are bowed upstream so that the power of down-rushing flood currents is less liable to break them than if they were laid straight across the river. The lines also are buried in the sand a depth of from three to seven feet, and at each joint in the line cast-iron river clamps weighing 1,460 pounds are attached to the line to give it weight and stability. When the present construction work is finished it is the intention of the company to begin taking up the line from Bowie to Gainesville. It will not be needed then, for Gainesville will be getting its supply from the Oklahoma fields, as will also the towns and cities south and east of Gainesville. Fort Worth will continue to receive the greater part of its supply from the Petrolia field. With Dallas, Gainesville, Denton, Sherman, Denison and other cities deriving their supply from the Oklahoma fields, it is thought the supply of gas for Fort Worth from the Petrolia fields will be more than adequate for the city's needs. If it should develop that the supply was inadequate, gas will be supplied from the Oklahoma fields. In fact, officials of the company have said that probably all the lines of the system will be kept open and the pressure from all sources equalized. In that event Fort Worth and Dallas and adjacent towns would receive a mixture of gas from the two fields.

GAS LITERATURE AT A GLANCE

Conducted by R. S. McBride and C. E. Reinicker, Bureau of Standards, Washington, D. C.

Chemical Condition of Nitrogen in Coal and Coke.

By E. Terres. "Journal für Gasbeleuchtung," 59, 519-21 (1916); via "Chemical Abstracts."—In carbonization 40-65 per cent. of the nitrogen of the coal remains in the coke, 10-14 per cent. is recoverable as NH_3, and the rest is lost as free nitrogen or cyanogen in the gas; a little, however, is found in the tar. By slow distillation it is possible to recover as much as 35 per cent. as NH_3, and it seems probable that the nitrogen is split off in the first place as NH_3. Terres has attempted to discover what classes of compounds yield NH_3 on distillation. Glycocoll, asparagine, egg albumin, animal glue, pyridine, azobenzene, hydrazobenzene, acetonitrile, phenyl isocyanate, and nitrobenzene were all subjected to dry distillation. NH_3 was liberated from the amino and substituted amino compounds only. The conclusion is drawn that the nitrogenous compounds of coal must have the character of proteins. In coke, the nitrogen is probably in the form of a nitride of carbon, as suggested by Rau and Christie. This is confirmed by the experiments of Sachs, who showed that on gasifying coke with air and steam, 89 per cent. of the nitrogen could be recovered as NH_3.

Combination Coal and Gas Firing.

By Alex. W. Morgan. "Electrical World," 70, 52-4 (1917).—Results of tests to determine efficiency and adaptability of confined fuel; details are given.

Color Temperature of Illuminating Gas Flames.

By E. F. Kingsbury. "Journal of the Franklin Institute," 183, 781-2 (1917), via Chemical Abstracts.—The following evaluations of color temperatures are given, based on data of Hyde and Forsyth. Each flame was matched against a carbon lamp whose efficiency was accurately known at several voltages. The first figure in each case is the lamp voltage and the second the color temperature in degrees Centigrade: (1) Coal gas, full flame, 111.0, 2075; (2) coal gas, half flame, 107.5, 2035; (3) water gas, full flame, 115.4, 2118; (4) water gas, half flame, 105.5, 2015; (5) mixed gas, full flame, 113.5, 2095; (6) water gas, full flame, edge on, 111.5, 2080; (7) coal gas, full flame, 113.8, 2100; (8) coal gas, candle shaped flame, height of Hefner, 97.0, 1940 (reference points, from paper cited); (9) pentane lamp, 93.5, 19[illegible] (10) 4.85 w. p. m. s. c. p. carbon, [illegible] 2070; (11) 3.73 w. p. m. s. c. p. carbon [illegible] 18.8, 2153; (12) Hefner, 88.0, 1875. The burner for Nos. 1 to 6 was an 8 ft. von Schwartz excavated head lava tip, for No. 7 an 8 ft. Bray Union jet tip and for No. 8 a ¼ in. open tube. The coal gas had 8-9 c. p., and 575 B. t. u.; the water gas 27.5 c. p. and 690 B. t. u.; the mixed gas 25 c. p. and 665 B. t. u.

Peat Powder Fuel for the Swedish State Railways.

Anon. "Engineering," 104, 125-6.—The advantages of peat powder as compared with ordinary peat fuel are that the proportion of water present can easily be kept below 12-15 per cent. and that it lends itself easily to automatic stoking. The process of preparing peat powder is described.

Reduction in Heating Value (of Natural Gas) Due to Recovery of Gasoline Content Very Slight.

By P. McD. Biddison. "Natural Gas and Gasoline Journal," 11, 213-4 (1917).—The reduction in heating value of a natural gas due to the removal of its gasoline content may be closely established. Assume 0.0001 gallons of gasoline obtained from every cubic foot of gas having an original heating value of 1,000 B. t. u. per cubic foot. One gallon such gasoline has specific gravity about 0.667, weighs 5.549 pounds per gallon, has heating value of 20,400 B. t. u. per pound, and occupies about 35 cubic feet as a vapor. From these data the heating value of one cubic foot of the "dry" gas is calculated as 992.17 B. t. u., which is a reduction in heating value of 0.8 per cent. To determine accurately reduction in heating value by calorific determinations, an average must be made of a large number of determinations on gas before and after removal of gasoline. Such determinations made by Biddison show loss of 22.98 B. t. u. per cubic foot on gas of 1,060-1,100 B. t. u. The amount of gasoline extracted is not given. Reduction in heating value is so small as to have no effect on the value of the dry gas to consumer; while removal of gasoline eliminates much trouble occasioned by gasoline condensing in pipelines.

Economy of Coke Gasification.

By J. E. Enright. "Gas Journal," 138, 185-6 (1917), via "Chemical Abstracts."—A carbureted hydrogen gas plant installed at Tralee, Ireland, produced 15,225,100 cubic feet of gas, using 363 tons, nine hundredweight of coke and 10,197 gallons of tar, over a period of 10 months. During the same period in a coal-gas plant, 14,885,900 cubic feet of gas were made from 1,357 tons of coal. The fuel economy is evident. The water-gas plant is simple in construction and operation, the latter requiring the services of only one man. The burners on the district supplied are adjusted for a mixture of equal parts of the two gases, and this adjustment is found to be satisfactory for any mixture from 50 to 100 per cent. water-gas. The equally mixed gases give from 475 to 500 B. t. u. and the water-gas alone a value of 400 B. t. u. The CO_2 is kept below 18 per cent.

Fuel Briquets.

By F. C. A. Lantsberry and J. D. Paton. "Mechanical Engineering," 39 (1917); "Science Abstracts," 20B, 125.—A brief survey of modern practice in the briqueting industry.

Extension of the Tottenham District Light, Heat and Power Company's Works.

Anon. "Engineering," 104, 113-6 (1917).—A description of the new gas producers, gas holder and the Woodhall-Duckham vertical retort installation recently installed at the Tottenham Gas Works, England.

Low Temperature Carbonizing and Some Products.

By R. Maclaurin. "Journal of the Society of Chemical Industry," 36, 620-6 (1917), via "Chemical Abstracts."—A producer has been constructed which permits of the low-temperature carbonization of non-coking coals. It can be applied to the manufacture of illuminating gas and smokeless fuel as well as the production of power gas, both with oil and ammonia as by-products. The top of the producer has a jacket fitted with a collar. The condensing oils run down to the collar and are trapped and run to a steel tank. The gases ascend through the first scrubber and are washed with a water spray containing about 0.5 per cent. H_2SO_4. From the scrubber the gas is drawn to burners. When used in making smokeless fuel, the coal is uniformly carbonized from the outside to the center of the charge. The coke has very little volatile matter and very little heat is required to effect carbonization. The gas produced contains only a small percentage of light olefins. Crude oils obtained from cannel coal resembled shale oils rather than coal-tar oils. The crude oils showed a relative absence of light portions—benzene homologs, carbolic and cresylic acids—but contained resinous substances. The non-resinous oils obtained from the crude oil had good lubricating qualities, while the crude oil itself had good drying qualities. The presence of dye bases in the NH_3 liquor and crude oil was verified.

Tar Oil Fuel and Diesel Engines.

By Geoffrey Porter. "Engineering," 104, 77-8, 105-7 (1917).—A discussion of tar oil specifications and a review of results obtained in actual operation with the use of tar oil in Diesel engines. Among the proposed standards for the fuel is that of Batho: (1) density, 1.0 to 1.1; (2) viscosity, 2° Engler; (3) flash point, 100-130° F.; (4) color, a drop on white paper should show no black residue; (5) calorific value, 15,800 to 16,000 B. t. u.; (6) ash, one per cent. or less; (7) H_2O, one per cent. or less; sulphur, 0.5 to one per cent. Porter describes at length his experiences with its use in a Diesel fitted with a pilot jet ignition gear and sums up as follows: (1) Running time, eight months; (2) hours running, 2,671; (3) average load, 58.5 per cent. of full load; (4) weight of oil fuel per kw. hour (tar oil with 14.9 per cent. of petroleum oil), 0.826 lbs.; (5) established saving on basis of cost of petroleum oil, 0.494d. per kw. hour or a total of £372 7s. 6d.

Eclipse News Bulletin

Rockford, Ill.,
Nov. 12, 1917.

For your information, we quote below from the "Monthly Review of Business" of November 1st, issued by the National Bank of the Republic of Chicago. We feel that the information given is very important to the gas industry just at this time.

"There is every reason to believe that the adjustment of business to a war basis is nearly completed. For months the country has been dealing with uncertainties—trying to anticipate the effect of war legislation and to gauge the extent to which war requirements would divert the stream of accustomed business. THESE ARE NOW CERTAINTIES. It may be assumed that most of the radical changes in the conduct of trade and industry have already been made, and that any further supervision will be in the nature of extensions of policies already laid down. While there is still some doubt as to the ultimate effect of taxes, combined with high operating costs, upon corporate profits, there is lessening apprehension even on this score. Price-fixing on the whole has been done wisely, perhaps more wisely than is generally understood. Our most vulnerable spot, through which disastrous consequences might ensue upon a sudden ending of the war, is in the matter of prices. Artificial price regulation of our principal basic commodities, while snuffing out all legitimate price advances along with speculation, should tend to stabilize our whole price structure, AND SHOULD PROVE MOST EFFECTIVE IN ARRESTING ANY PRECIPITATE DECLINE IN VALUES when the enormous consumption of commodities for war purposes comes to an end.

"In so far as private consuming interests are concerned, the PRICES FIXED FOR IRON, STEEL, COPPER, COAL AND COKE ARE OF SECONDARY IMPORTANCE. The demands for our colossal war program, combined with the already heavy contract obligations of the producers, LEAVE VERY LITTLE OF ANY OF THESE MATERIALS AVAILABLE FOR NEW PRIVATE BUYING. At the same time the steadily decreasing labor supply has tended to reduce operations below capacity, the labor influence being seen in one form or another in the case of each of these commodities. Since March, the average daily output of pig iron has fallen progressively, the immediate reasons being the car shortage and an insufficient coke supply, the latter condition traceable, however, to the scarcity of labor at the coke ovens. In the steel industry as well, the shortage of labor militates against capacity production, although it is less pronounced because of the numerous wage increases that have gone into effect. Government requirements for steel still dominate the market to the almost total exclusion of private buying."

With the purchasing power of labor greater than ever before, you will want to make sure that your supply of gas appliances for the coming season can not be cut off. We have raw material and are in a position at present to quote prices for immediate contract for delivery up to September 1, 1918. As soon as we accept contracts covering our present supply of raw material, we will be obliged to accept additional orders, subject to our ability to secure raw material.

This year it must necessarily be a case of "FIRST COME—FIRST SERVED." We are ready to go into further details and hope to have the pleasure of hearing from you by return mail.

Yours very truly,
ECLIPSE GAS STOVE COMPANY.

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Place your orde
Take delivery now of all yo
Cover now for your future ne

SERVICE FIRS

No. 757. Extra Capacity Cabinet

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ROCKFORD, ILLINOIS

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—Eclipse

Eclipse News Bulletin

Rockford, Ill.,
Nov. 14, 1917.

The enormous tonnage to be moved, and the lack of cars and motive power is making it difficult to move merchandise. If this condition exists now with ideal weather conditions making it possible for transportation companies to move big trains on schedule, what will conditions be with unseasonable weather when trains are reduced to one-third of those at present and unusual and unreasonable delays occur?

Government demands have been unusually heavy and in order to take care of them, it has been necessary to practically turn over 260,000 miles of railroad to the Government and the operation of all railroad lines now lies in a board of five men.

They have accomplished wonders and while the actual number of unemployed cars is less, while the actual number of cars reported short is less than it was before this action was taken, a serious condition still confronts the country due to the necessity of moving supplies, munitions, troops and the regular lines of merchandise which must be moved in the course of business.

It is conceded Governmental demands will increase materially the next six months in moving troops, supplies and munitions. The transportation companies' first aim, and of necessity to the successful carrying on of our war activities, must be to supply equipment and move such munitions.

This condition is one of the most serious that now exists because it casts a shadow on the profitable distribution of all merchandise, for even if able to obtain at the source of supply but unable to move, there can be no profitable distribution.

If your warehouse facilities are limited and you must go outside for space, you can best afford to order now for early shipments, at least a part of your 1918 requirements. From a dollar and cent standpoint, you are bound to be ahead by such foresightedness.

Our stocks of raw material are in fine shape. We have anticipated the demand by buying ahead and taking immediate deliveries. In line with our slogan "Service First—Profit a By-Product," we ask your earnest attention to, and consideration of, this question which is to worry us all early in the spring and summer of 1918.

We are now in a position to supply Eclipse Ranges to our trade promptly and urge upon our customers the necessity of early shipment to obviate disappointment due to shortage of cars and inability to move freight later in the year.

We have accepted the situation as it presents itself and our judgment, together with a patriotic desire to assist as far as possible in relieving the abnormal conditions confronting the transportation companies and avoid congestion in freight movement later, are the factors that urge us to present this question to our customers.

With that object in view, we ask your serious consideration and co-operation along these lines.

Yours very truly,

ECLIPSE GAS STOVE COMPANY.

Conditions for the Formation of Coke.

By George Charpy and Marcel Godchot. Comptes rendue 164, 906-8 (1917). —The coefficient of compressibility (kg. per cm.^{2}) is proposed as a measure of the quality of coke. The coal to be tested is pulverized to uniform size (120 mesh) and saturated with water vapor at 18-20°, then charged into a porcelain tube under a pressure of five kg. per cm.^{2} and heated in an electric furnace kept at constant temperature. A series of experiments made to determine the optimum temperature of coke formation for various coals gave the following results:

	Resistance to Compression kg. per cm.^{2}		
	Coals From		
Coking Temp.	(1) Saint-Eloy	(2) Ferrieres	(3) Noyant
650°	19.85	19.0	100.0
800°	32.9	30.5	93.6
1000°	38.7	45.0	36.3

By varying the heat treatment, viz., by raising the temperature gradually from 650° to 1,000° coke (1) is not improved, but the compressibility of No. 3 rises to 130 kg.

Coke, and the Distillation Products of Coal.

By Emile Saillard. Revue general chimie, 19, 89-92 (1916).—A general discussion of the subject.

Utilization of Coke By-Products.

By C. G. Atwater. Colliery Guardian 112, 317-8 (1916).—A general discussion of the by-product coke oven industry.

Testing of Lubricating Oils.

By H. K. Moore and G. A. Richter. Metallurgical and Chemical Engineering, 16, 692-4 (1916).—The selection of the most suitable lubricating oil for plant operation depends on the special conditions under which the oil is to be used, the cost of the lubricant and the cost of power. An apparatus has been developed which measures relatively the durability and also the internal friction or "power consumption" of the oil in question. The apparatus as employed in the tests aims to duplicate that type of bearing in which the oil is present in excess.

Some Tests on Coke Firing.

By Anon. Electrician 79, 422 (1917), via Chemical Abstracts.—Tables show results obtained by the use of coke breeze in a B. & W. boiler equipped with hand-fired grate with undergrate forced draught, supplied by fan or steam blowers at a London gas works and at a Scotch gas works. At the first plant 25.2 lbs. of coke breeze per sq. ft. of grate area per hour gave a boiler efficiency of 75.10 per cent. With automatic stokers, a special furnace setting for a chain grate stoker and with the assistance of undergrate draught, was employed. At the Scotch plant three tests were made with unscreened breeze of different sizes for each test and one test with screened breeze. This installation consisted of a pair of boilers working continuously with no superheater or economizer. The efficiencies varied between 67.57 and 71.01 per cent. With stoker hoppers, hand-feed and careful mixing, coke breeze (up to 50 per cent.) and bituminous coal may be burned with natural or induced draught.

Recovery of Benzene and Its Homologues from Coal Gas.

By J. E. Christopher. Colliery Guardian 113, 1121-2, 1167-8 (1917).—A detailed discussion of the processes employed, with numerous machine designs.

Rectification of Benzole.

By W. Newton Drew. Colliery Guardian 93, 179 (1917).—A discussion of some of the modern phases of the subject.

Coke-Making Problems and Their Solutions.

By H. E. Bloor. Colliery Guardian 113, 897 (1917).—A description of mechanical improvements made in the York Gas Works.

Producer Gas and Its Industrial Uses.

By F. W. Steere. Metallurgical and Chemical Engineering, 16, 695-9 (1917); Iron Age 99, 1376-8 (1917), via Chemical Abstracts.—A description of producers, detarring and regenerative and recuperative furnaces. With properly designed regenerators it is possible to recover a much higher percentage of the heat in the waste gases than is possible with recuperators. The advantages of metal recuperators are in preventing leakages and short-circuiting. The disadvantage lies in their very rapid deterioration, especially at high temperatures. The disadvantages of regenerators, on the other hand, are that they must be reversed at intervals of approximately 20-30 min., which involves additional mechanism and operating complications. A very weak gas can be used in a properly designed furnace. Costs for heating with producer gas are usually lower than for heating with oil. In considering the substitution of producer gas for oil it must be remembered that producer gas cannot be considered for small installations, that local conditions and the price of oil determine when a producer gas plant is or is not advantageous, and that a producer gas plant should be run 24 hours per day to realize the best com. results. The advantages of producer gas are that it furnishes a dependable fuel supply under the full control of the operator, and that it can be used for all classes of heating work including enameling. The flame temp. is low and the gas volume large, so that no intermediate hot spots result in the furnace and the repairs to brick-work are minimized. The highest furnace efficiencies are possible with the gas, while more uniform heating of stock and more accurate control of temperature are possible.

Distillation of Wood and Other Vegetable Products.

By Anon. Bulletin of the Imperial Institution, 14, 566-77 (1916), via Chemical Abstracts.—The destructive distillation of the Black Wattle wood and Olive wood from the East Africa Protectorate gave 4.7 and 3.0 per cent. of acetic acid, 1.2 and 1.6 per cent. of CH_3OH, 6.0 and 7.4 per cent. of sepd. tar, and 27 and 29 per cent. of charcoal. Pine and oak woods gave 2.2 and 4.4 per cent. of acetic acid. Satisfactory charcoal was made from cocoanut shells in Ceylon, and also from the vera wood.

Relation of Sulphur to Variation in the Gravity of California Petroleum.

By G. S. Rogers. Bull. Am. Inst. Mining Eng. (1917), 1023-39, via Chemical Abstracts.—"It is the purpose of this paper to call attention to the chemical action of sulphur and oxygen on petroleum, to show that the density of the oil from any one field is intimately related to its sulphur content, and to discuss the possibility that oil in its migration will encounter and take up sulphur oxygen." Rogers presents the matter under the captions: (1) chemical action of sulphur and oxygen on petroleum; (2) relation of density to sulphur content of oil from California fields; (3) possible source of sulphur and oxygen; (4) sulphur and density in relation to the migration of the oil; (5) bearing of the reactions outlined on the migration and origin of oil in general. The paper contains numerous references to the literature and curves showing the relation of density to percentage of sulphur in oil from the Coalinga, Midway-Sunset, and Santa Maria fields.

Stopping and Restarting a Gas Works.

By "Societe Technique du Gaz," via "Gas Journal," 139, 234 (Aug. 7).—The plant at Angers, France, was obliged to shut down for a week on account of coal shortage. The supply of gas was stopped simultaneously with the cessation of carbonization, a two days' notice being given in the press and by municipal proclamation. On completion of carbonization of the charge, the hydraulic mains were completely filled with water, and the stand pipes were closed off by flap valves with which they were fitted. The coke was left in the retorts and the latter were kept sealed. The primary and secondary air dampers were closed and the stack damper partially closed. The furnaces were maintained at a much lower degree of heat by supplying them with about as much coke as when working. The holder inlet valve was left open as was also the outlet valve, the customers being requested to close all meter cocks and outlets. A pressure of about $\frac{1}{10}$ inch was maintained at the lowest point of the system, giving about one inch at the highest point. In spite of requests by the company some consumers at the higher altitudes continued to use gas, causing as much as 4/10 inch vacuum at the low points for a few hours. This led the company to start up again sooner than intended on a very inferior grade of coal. The primary air ports were first opened, then the secondary ports. The gases ignited without accident. The normal temperature was reached in 48 hours. The water in the hydraulic was brought back to its usual level, the gas valves opened and operation resumed. Consumers were advised of resumption of service by a widely distributed notice. About one-fourth of the public lights were lighted the night before resumption after having slightly increased the works pressure. The resumption of supply to customers was attended by no ill effects. It was demonstrated, however, that while the maintenance of a continuous gas supply is at times very difficult, the difficulties and dangers of cessation of supply are much greater.—D.

Value of Peat Fuel for the Generation of Steam.

By John Blizard. Canadian Department of Mines, "Bulletin" of the Mines Branch, 17, 42 pp. (1917).—This bulletin is a detailed report of the results of tests of peat fuel used with boilers of different types. The author concludes that peat fuel for steam-raising cannot compete with good steam coal costing $5 or less per ton.

Some Future Lines of Advance in Coking Practice.

By G. E. Foxwell. Journal of the Society of Chemical Industry, 36, 525-8 (1917), via Chemical Abstracts.—English coking practice may be improved (1) by shortening the coking period by increase in temperature to increase output, e. g., by running a 12-ton charge for 16.5 hours as in American practice instead of an 8-ton charge for 26 hours; (2) by using an oven brick higher in SiO_2 to allow higher temperatures—the secret of superiority in American practice; (3) by improvements in charge mixing whereby good coking coals may be diluted with those of inferior quality; (4) by improvement in quenching methods, to regulate the water content of the coke; (5) by conserving the breeze and other by-products to a greater extent, e. g., by briqueting; (6) by consuming washery refuse in producers of the Mond type; (7) by perfecting a method for making $(NH_4)_2SO_4$ using the sulphur in the coal as the source of the necessary H_2SO_4; (8) by the recovery of benzene as a 55 per cent. product instead of 65 per cent. thus increasing the yield of toluene; (9) by taking up the manufacture of benzene derivatives such as $C_6H_5NH_2$, $C_6H_5NO_2$ and the like at the plant, and, (10) by stopping gas wastage-equiv. in England to the loss of 1,000,000 tons of coal annually.

Some Personal Experiences With Hand-Firing of Coke.

By J. A. Crowther. Electrician 79, 423 (1917), via Chemical Abstracts.—With a gas cope of about 83 per cent. fixed carbon, a calorific value of 12,000 B. t. u. and 6.5 per cent. ash, an average of 6.75 lbs. of water was evaporated per pound in a B. and W. boiler, when the temperature was 40°. With a clean boiler the evaporation was 8.15 lbs. per lb. of fuel. The flue gas showed 18 per cent. CO_2 and could easily be maintained. Hand-firing affected the side walls, arch, and back walls severely. After two months, considerable patching and an occasional new brick were needed and after six months the greater part of the furnace required brick renewal. Silica brick (9 inches by 9 inches by 18 inches) were used from the grate level on the side walls and were worth the extra cost. General advantages and disadvantages of coke as fuel were given. Coke caused intense heat in the fire box, but this was practically overcome by use of steam jet blowers under the furnace, when the steam was converted to water gas in passing through the incandescent coke and burned with moderate length of blue flame. Crowther preferred the use of slack where the price per ton of these fuels of similar calorific value approximated; at least until satisfactory automatic stokers appear.

Oil Burning.

By B. S. Nelson. Journal of American Society of Mechanical Engineers, 39, 487-94 (1917).—A general discussion of the subject with a temperature-viscosity diagram for a considerable number of fuel oils.

Coal Concreted from Ashes or Dusts.

By R. G. Lovell. Electrician 79, 428-9 (1917), via Chemical Abstracts.—A process was evolved enabling briquets to be made without pressure from waste products of calorific value. Satisfactory fuel must be non-friable, non-caking, non-clinkering, good coking, and have a good flare and good incandescence. Coal was concreted from dust alone; from coke dust alone; from destructor ashes alone; from destructor ash and coal dust, and from clinker bar ash and sawdust. The British thermal units developed in each case and costs are given. The better grades burn like coal and the others like coke. Crushers, screens, drying tables, mixers and molds complete the equipment. Costs depend upon the value put upon bases, cost of matrices (glucose, pitch and the like) and the cost of chalk or other form of $CaCO_3$ used with the binder. Millions of tons of coal slack may be concreted into excellent "coal," all coke dust utilized, and sawdust, household ashes and municipal destructor ashes may be made into cheap flaring "coke." Industrial concerns burning ten or more tons per day can save one-third and necessary work can be done by existing machinery and unskilled labor. Coal briquets may be made by heating in molds, boiling in tar boilers, or exposing, in hot climates, to the sun. The matrix consists of any form of $CaCO_3$ and some form of bitumen or a sugar waste product.

Report of the Committee (of Institution of Gas Engineers and of the Society of British Gas Industries) on Life of Gas Meters.

By J. Bond, et al., "Gas World," 66, 455-61 (1917).—The chemist reported investigation of three meters having no particular relation to each other. The first contained considerable deposits of brown material which had eaten through the tin and into the steel plate of the inlet and valve chamber. Analysis showed CS_2 extract, sulphur 20.62 per cent., cyanogen in terms of $Na_4Fe—(CN)_6 10H_2O$ 3.89 per cent., Fe_2O_3 40.44 per cent., loss on ignition 21.29 per cent. This is evidently mostly fine dust carried over from the purification boxes. The second meter examined was constructed of sheet covered with a special alloy. Here the valve chamber was free from an actual deposit of Fe_2O_3, but showed considerable corrosion. Analysis showed this to be mostly zinc but there was some iron, tin, sulfide, cyanide, ferrocyanide, and sulphate present. Apparently the sulphide and cyanide had not been completely removed from the gas and had attacked the alloy. A third small meter showed a large deposit, of which 78.25 per cent. was Fe_2O_3. In this case the tin was bright and unattacked. Aside from the purification boxes the water was the only possible source of iron and it seems improbable that such a large deposit could have accumulated from it.

Maclaurin Low Temperature Process of Carbonization.

"Gas World," 67, 4-6 (1917).—An experimental plant for the production of smokeless fuel and illuminating gas and also for power gas at low temperature was erected at Port Dundas. For the production of power-gas, air and steam were blown into a vertical compartment containing the fuel, the gas passing up through it and distilling off the oils. The heavier oils condensed and were trapped in a collar from which they overflowed to a seal tank. To extract the light oils, the gases passed through a diluted sulphuric acid scrubber. A fairly uniform power-gas free from stringy masses of tar was easily maintained. The production of smokeless fuel worked smoothly, the coking of a ton of coal requiring about two hundredweight burned. The burning took place in a separate compartment to prevent the ash being mixed with the coke. Two coking coals and one cannel have been coked with success. Analyses are given. The low temperature of volatile matter is noticeable but tests show the coke is easily kindled. To carbonize, only a comparatively small quantity of gas was necessary, but the resulting gas was low in calorific value. The oils obtained were, in the case of cannel coal, lighter than water, brownish green in color, buttery in consistency, paraffinoid in character, and had a setting point of about 30°. The coking-coal oils, on the other hand, were heavier than water but darker and of about the same consistency as the other oils; they were, in general, less paraffinoid and set at about 20°. Both retain considerable water with great tenacity. Some experiments to find uses for the oils have been carried out. When separated with paraffin, extracted with NaOH, and again separated with acid, a good lubricant is obtained. The resins, when thinned with solvents, give satisfactory varnishes. A number of more or less fast dyes also were produced by acid and alkali treatment. The data with reference to NH_3 yield shows 40 to 63 pounds of sulphate for different coals. More work will be done along this line.

Detection and Determination of Sulphur in Petroleum.

By C. K. Francis and C. W. Crawford, Journal of Industrial and Engineering Chemistry, 9, 479-81 (1917).—The methylene blue test gives satisfactory results for the detection of sulphur. The sodium nitroprusside test is not so good. For the quantitative determination of sulphur fusion with a Na_2O_2 or a modified Dammer combustion method is recommended. Most of the sulphur in the crude oil from the Cushing field is probably in the form of alkyl sulphides.

Estimation of Toluene in Crude Petroleum.

By S. E. Bowrey. Chemical Trade Journal, 60, 425-6 (1917).—The extraction of the aromatics from crude petroleum by means of liquid SO_2 serves as the basis of the method for the estimation of C_7H_8 in petroleum.

Debenzoylation of Illuminating Gas.

By L. Fabre. Revue general chimie, 19, 92-5 (1916).—A brief description with flow sheet of an English gas plant.

LEGAL DECISIONS

Discontinuance of Service for Non-Payment of Bill.

A water or electric light company, engaged in supplying water or light to residents of a municipality under a franchise from such municipality, cannot lawfully refuse to furnish such service to a consumer because the consumer declines to pay for past due service for some other and independent use, or at some other place or residence. A public service corporation cannot cut off a supply of water or electricity to enforce a payment of a disputed claim. Such a company has the right to demand payment in advance, or a reasonable deposit to secure payment for the contemplated service.—Miller v. Roswell Gas & Electric Co., Supreme Court of New Mexico, 166 Pacific, 1177.

Privileged Criticism by Gas Engineer.

Where the consulting engineer of a gas company, engaged to straighten out its affairs, in reply to a letter from the secretary of the railroad commission, recommended the president should be required to resign and a local man selected president, and stated that prepayment meters had been grossly mishandled, and indicated a system of systematic stealing from the company, the method of reading the meters being antiquated and permitting fake readings, such statement was privileged, and cannot be deemed libelous.—Ferrier v. De Freese, U. S. District Court, Georgia, 243 Federal, 765.

Gas and Oil Are Minerals Declares Court.

Oil and gas are minerals, within the meaning of the reservation by deed of "all mineral rights" upon the land described in the deed. The defendant land company conveyed the land in question to one through whom plaintiff claims, reserving in the granting clause all mineral rights upon the above described lands, and the right to enter thereon and to use so much of the surface as may be reasonable for the purpose of extracting the mineral thereon. Held, this reservation is not repugnant to the covenants of title. Held, further, this reservation excepted from the conveyance the right of defendant land company to enter upon the land for the purpose of exploring and extracting the oil and gas. Plaintiff took the title with this exception and burdened with this right.—Barker v. Campbell-Ratcliff Land Co., Supreme Court of Oklahoma, 167 Pacific 468.

Gas and Oil Lease.—Executing Second Lease on Same Land.

Where a grantor who owns the land executes a gas and oil lease upon a certain tract of land and afterwards executes extensions of such lease, and subsequently executes to another an oil and gas lease upon the same land, such last-named lease cannot prevail against the former lease and its extensions, unless the lessee of the second lease had no knowledge of the former lease and its extensions, or had no such knowledge as would put him upon inquiry, and which, if followed up, would have disclosed the existence of such lease and its extensions—Swan v. O'Bar, Supreme Court of Oklahoma, 167 Pacific, 470.

Authority of Public Service Commission.

As a gas company was entitled under the law to fix its own rule or rate of depreciation, and fixed it at eight cents, the public service commission, without taking an independent proceeding against the relator, could not make an order requiring it to change its whole system of accounting, and put its depreciation charges on another basis, requiring a greater percentage of contribution thereto, than that adopted by the company under the law and earlier order of the commission, as a condition precedent to its consent to a bond issue. —People, ex rel. v. Kings County Lighting Co., Supreme Court of New York, 166 N. Y. Supp., 196.

Forfeiture of Gas and Oil Lease for Non-Assessments.

Under oil and gas leases providing that, if the lessee failed to do the annual assessment work upon any unpatented mining claim prior to September 1st and to record the necessary proofs thereof for any year, the leases should be void as to such claims, and that money expended by the lessee should be regarded as in full rental of such claims, under which the lessee obtained patents for 6,000 acres of an 8,000-acre tract, a breach of such provision as to remainder did not justify a forfeiture of the lease upon the part upon which the patents were issued, or a judgment for its possession.—Jameson v. Chanslor-Canfield Midway Oil Co., Supreme Court of California, 167 Pacific, 369.

Regulation of Rates a Sovereign Power of State.

The power to regulate the charges for public services by municipal corporations is the power which it was the intention of the framers of the constitution should be exercised by the sovereign power only. Such power is inherent in the state, and is a necessary attribute of sovereignty. No specific authority having been conferred by the constitution upon cities to fix and regulate the charges for gas in municipalities, the legislature had the right to legislate thereon whenever in its judgment the public interest required such action. The power delegated to the city of Pawhuska to regulate charges for light and gas under section 593, Rev. Laws Okla. 1910, was such a grant of power as could be taken away from said city by the legislature and conferred upon the corporation commission, as was done by chapter 93, Session Laws 1913. The order of the corporation commission establishing rates for gas to be charged consumers in the city of Pawhuska by the Pawhuska Oil & Gas Co., and requiring the installation of meters is a valid order under said act, and said order of the commission is not repugnant to section 15, art. 2, of the constitution of Oklahoma, nor to section 10, art. 1, of the constitution of the United States.—City of Pawhuska v. Pawhuska Oil & Gas Co., Supreme Court of Oklahoma, 166 Pacific 1058.

Restraining Enforcement of Rates Fixed by Utilities Commission.

Where, at suit of receivers for a natural gas company appointed by a state court, a federal court granted a preliminary injunction, restraining the enforcement of rates fixed by the state public utilities commission, it was appropriate for the state court to make an order establishing temporary rates to be charged by its receivers, and such order does not affect the jurisdiction or power of the federal court to proceed to final decree in the injunction suit.—Landon v. Public Utilities Commission of Kansas, U. S. District Court, Kansas, 242 Federal, 658.

Gas Explosion Not Evidence of Employe's Negligence.

In action for death of a railroad servant, killed by the explosion of a power plant, where there was no direct proof as to how the gas escaped or accumulated, or that doors or windows were closed, nor any evidence of what deceased did after entering room, the happening of the accident was no proof of the employer's negligence, and the plaintiffs had the burden of proving it. —Williams v. Western & A. R. Co., Court of Appeals of Georgia, 93 Southeastern, 555.

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Supervising Employes' Health

New Development of Welfare Work Proves Highly Advantageous to the Public Utility Both in Direct Dividends and in Esprit de Corps

By G. D. Crain, Jr.

Gas companies are among the leaders in the big and growing field of health supervision in industry. This is a kind of work which has paid large dividends, not only directly but in the development of esprit de corps and loyalty to the company. It has proved a good investment of the time and money which have been expended in the effort to improve the health and better the working conditions of all those employed by the gas company.

"Health supervision" is a phrase which has come into general use as signifying the sort of work which has often been described under the general appellation of "welfare work." The latter is not a popular descriptive, for the reason that it suggests that the employer is maintaining it as a charity, whereas the mutual character of the effort is well understood both by the company and the employe. Welfare work, of course, is not limited to health supervision, so that the latter is the narrower term, but it is a more accurate descriptive of the betterment efforts that the principal public utility companies are now carrying on.

Health supervision is nedeed in every department of the work. Not only are those employed in the gas works and in construction kept under the supervision of the medical department, but the large number doing office work are likewise included, so that they will get the benefit of the company's plans. Wherever there is any considerable group of workers, it pays to undertake work of this kind, if only to eliminate those with contagious or infectious diseases.

Physical examinations are found to be a desirable feature of health supervision. These are undertaken when the applicant is being considered for employment, and the facts developed by the examination become part of his permanent record. It often happens, especially in the case of men who are going into the manufacturing end of the business, that certain physical defects, of which the man himself was ignorant, make it advisable to place him at work where his defect will not cause any danger to himself or to his fellow-workmen.

Liability to Injury.

It has been pointed out frequently by industrial physicians of late that the man who is not physically perfect has fewer accidents than the one who is without defects. The reason is that the work has been carefully adjusted to the former, while no such limitations have been placed upon the employment of the physically perfect individual. Thus there is the paradox of the less perfect workman having the better record in regard to injuries, to which it might be thought that he would be more liable. He would, of course be more likely to get hurt if he were put on the job without the help of an examination by the company's medical men, but with it he is directed to the kind of work which he can do without difficulty.

The enactment of workmen's compensation laws has made the work of health supervision decidedly advantageous, judged solely from the standpoint of dollars-and-cents. This statement will bear analysis, even though it might be thought that accidents and health supervision have no direct relationship. The value of physical examinations in reducing accidents, by proper adjustment of the job to the man, has already been pointed out. The general effect of health supervision is also to improve the health of the workers, to establish better standards of personal hygiene, and to make the slight ailments which affect the average worker, whether in the plant or the office, less frequent.

Healthy Man Is Alert.

It is obvious that the man who is in tip-top condition is alert, and that the hazards which are constantly confronted can easily be avoided. The man whose condition is below par on account of sickness, and whose senses are somewhat dulled by his depressed condition, is not able to see and appreciate the dangers which arise in connection with his work, and therefore, has an accident. The report of the accident may not indicate that it was due to the bodily trouble, but nevertheless, this has been the controlling factor. Over a considerable period ment has an opportunity to show up in of time, where work for health better-the records, this is proven beyond any question.

While the employe of the gas company who is engaged in routine work, free from the hazards which are noted in connection with the manufacturing and construction departments, is apparently not in need of help in regard to his health, it is also true that the sort of work which he does is largely influenced by the way he feels, and that if he is in prime condition, and is "on his toes" mentally, he will be able to do more work and better work at the same time.

Good for Office Workers.

In fact, while most industrial corporations which have undertaken health supervision have limited it to the employes of their plants, it would likely prove just as valuable in connection with their other employes. Certainly office workers, salesmen and those in similar positions need to be reminded of the fundamental laws of health, even though they may have been familiar with them. The gas company with a large number of employes would probably find it of advantage to circulate bulletins on the subject of health among its office workers, as well as others on its pay-roll, as the constant reference to this subject would undoubtedly bring about a better condition in this respect even among those who supposedly are not in great need of them.

The cost of medical service and health supervision is not as great as the casual observer might suppose. It varies, of course, with the extent of the service rendered. Many gas companies, for example, do not confine their work to the employes themselves, but assist them by having a nurse who visits the family when there is sickness and her services are desired. When visiting nurses are employed, this adds somewhat to expense, just as it does to the value of the service rendered.

Cost of Medical Service.

Not long ago an organization of industrial physicians made an interesting study of this general question of the cost of medical service, which is becoming of more and more interest, on account of the greater desire on the part of employers to do their share in the maintenance of good health on the part of their workers, and also because of the enactment of legislation having to do with the human factor in industry. The study was wide in scope, covering many classes of industries, and including small as well as large ones. The average cost was found to be $2.21 per year per employe. In other words, the cost of health supervision in these industries was something like two-thirds of a cent a day for each employe—certainly not a large item of expense compared with the value of the service rendered.

Includes First Aid.

This work always includes first aid, of course, and in the larger plants emergency hospitals are maintained. In most cases the extent of equipment of this kind is indicated by the location of the plant or office with reference to a hospital. In a great many instances the company is able to employ to good advantage a whole-time physician, who puts in all of his time supervising health work, making physical examinations, which include a good many re-examinations, of course, and seeing to it that the workers on the company's pay-roll are kept in the best possible condition physically.

Dr. Wilbur E. Post, chief surgeon of the People's Gas, Light & Coke Company, of Chicago, which is one of the leading gas companies of the country in the work it is doing for the maintenance of health conditions among its employes, recently summarized the value of physical examinations when he said:

Dr. Post's Views.

"The advantages to the employe of physical examination is apparent, for not only is the applicant protected from obtaining employment harmful to himself, but those already engaged in the industry are protected from the introduction among them of contagious diseases, incompetent co-workers, or those liable to cause accidents. The advantages to the employer are quite as great—the efficiency of the working force is increased, the employer is protected against unjust claims for injuries received previous to employment, or when the employe is not in service.

"The loyalty of the employe to the employer is noticeably greater when he learns to rely upon the honest and thorough work of the medical department. In fact, a striking and gratifying feature of this whole work is that whatever helps the employe helps the employer, and what helps the employer helps the employe."

Few Fail on Examination.

The subject of physical examinations often brings up the idea that applicants for work are examined with a view to rejecting just as many as possible; but, on the contrary, comparatively few men are turned down, but those who are not sound are given work which they can do without strain. As indicated by Dr. Post, this is an advantage to the man, since his health is considered in the kind of employment offered him, and the company is likewise protected, since it knows exactly what the condition of the man at the time of employment is, and in case of claims later on is able to determine whether the injury complained of happened before or after work was undertaken.

The desirability of physical examinations applied to office workers has not been as generally realized as in the case of industrial employes. However, where there are large numbers of people working together, it is of the utmost importance that all of them be in a healthy condition, since diseases are readily spread. The writer knows of a large telephone company which has been able to protect its operators, since the establishment of a medical department, through the examination of applicants for this class of work, as in a sufficiently large number of instances to attract attention cases of incipient tuberculosis have been located.

An Innocent Menace.

Had these girls been given employment, they would have been an innocent menace to the welfare of their co-workers, and further would have continued in ignorance of their condition; whereas the examination revealed this and enabled them to begin treatment which generally led to complete recovery.

The public utility is in many respects a leader in its community. Its example is followed to a large extent, especially where it is the principal employer. In undertaking health service and medical supervision, therefore, it is doing a work that will benefit the whole community, since it will not only be of value to those in its own employ, but will get other industries interested in the plan. Considering the wide scope of its possibilities, and the importance to the country of a healthy and vigorous population, it may be taken for granted that every company can afford to do something along this line.

Action in Denver.

An accident prevention scheme and health campaign in the nature of a competition has recently been instituted by the Denver Gas & Electric Light Co. in the hope of reducing the number of accidents at its plants and thus keeping the Denver organization working at full wartime efficiency. The action taken by the Denver company is one of the first results of a circular letter recently sent to all properties by R. G. Griswold, chief technologist of the Doherty Organization, urging them to take every measure to prevent illness and injury at this time when every bit of labor is essential to efficient operation.

In bringing this matter to the attention of the property managers, Mr. Griswold said, in part:

"We earnestly urge that you and your organization take particular care of your health. Our organization has found it necessary to put part of its reserves in the front line trenches. This means additional work for us today. Our reserves must consist of the overload ca-

pacity of the individuals. In order to have this overload capacity available, we must take care that each one of us is in first-class condition. Some of the means that suggest themselves are:

Some Health Rules.

"Keep close watch on your weight.

"Take particular care not to catch cold, etc.

"Take early and whole-hearted steps to stamp out any disease before it becomes chronic or develops into something worse. Don't run any chances.

"If you have a weakness toward any particular form of sickness, take double or treble precaution in that direction.

"A periodical or routine medical examination is not a bad investment.

"Always remember that something may happen to some member of your organization, or that some unusual demand may be made upon it which you will have to take up among the remaining members. To do this requires a little reserve capacity in each individual. We realize that sometimes we must all work day and night, but the most and best work is accomplished in the long run by a regular amount of sleep and a little play, even if the work has to be done in the remaining time by the most intense application."

Company's Announcement.

The Denver company has prefaced its announcement of the accident prevention program with these words:

"You men, who are producing heat, light and power for Denver and for the Denver industries making war supplies, are performing a necessary service for your country. Every day that you are absent from work means loss for you, for the company and for the United States."

Thirteen departments are included in the accident prevention competition. Each department has a handicap so as to correct for more favorable conditions in other lines of work, thus all departments are placed upon an equal footing in the contest. The contest began on November 8 and will continue until May 1, 1918. On that date, the department standing first, by having the fewest number of accidents, will receive a silver trophy cup from W. J. Barker, general manager of the company. The cup will be awarded every six months, and the department winning the trophy three times in succession will keep the cup. A cash prize of $100 will be given every six months to the foreman of the winning department. One of the novelties of the contest is that the score of the respective departments will not be based upon the number of accidents, but upon the loss of time resulting from the accidents.

Demand for Gas

H. O. Loebell Foresees Huge Development in Industrial Gas

Henry O. Loebell, head of the industrial fuel department of the Doherty Organization, recently said that the industrial fuel business was still in its infancy and that its future was unusually promising. He described the development of the industrial fuel business in various Doherty cities, with particular attention to Toledo, where the fuel business has been biggest, and said that the great amount of gas that the organization is now selling is only a small part of the great future demand which will be made upon it. At present, Mr. Loebell said, the Toledo company has contracted for an annual industrial fuel business of $1,000,000, but that the future of that phase of the gas industry in Toledo is so bright that in a comparatively short time $4,000,000 worth of business is likely to be the annual figure.

Commenting upon the present status and future development of the gas business, some of the things which Mr. Loebell said were these:

"As the gas business develops, there will be two phases of the situation which we should anticipate. The first of these will be the increase in domestic demand and the second the increase in industrial demand.

"As the domestic demand continues to increase, it may reach a point where it will be so great that it will force us to abandon some of the industrial business in order to take care of domestic consumers. Public service commissions will force us to take care of domestic consumers and leave the more lucrative industrial business alone. In the event of a scarcity of fuel for domestic consumption this winter, it may become necessary to use gas for heating and cooking in homes where it is not used at present. This will increase domestic consumption and decrease the amount of gas which can be supplied to industries. The only way to guard against our having to abandon part of our industrial business is to have gas manufacturing facilities enough so that we can supply both the domestic and industrial demand.

"In addition to the prospect of having greater demand come from domestic consumers, we are facing the certainty of increased demands from industrial users. This demand is being increased chiefly by the scarcity of fuel oil and the need for some fuel to use in place of it. Whereas we used to have to argue with manufacturers to show them the advantages of gas as fuel, they are now coming to us and demanding gas.

"Thus the problem of gas fuel for industrial purposes has shifted from one of utilization of gas, to one of creating a sufficient quantity to supply the demand. This is largely due to the fact that the efficiency of gas as fuel has been proved."

Humphrey "Radiantfire" Window by Roy Schuneman, Kewanee, Ill.

Our First Gas Driven Car

New York Consolidated Gas Co. Equips Cadillac Limousine With Storage Tank for Manufactured Gas—Equipment Details and Operating Results

By Robert E. Livingston

New York's first motorcar to be driven by the power of artificial gas has arrived. It has made its appearance in the streets of Manhattan during the last few days and, although its coming marks an event in the automobile history of this country—for it is the first car of its kind to be operated in America, as well—thousands of New Yorkers who have seen it running about town have passed it by without observing anything unusual in its appearance.

The fact is that this artificial-gas-propelled car is so little changed in its outward looks from the ordinary gasoline kind that the metropolitan public, generally so keen for novelties and sensations, hasn't been able to detect any difference. There is a difference, however, slight as it is. Along the running board on one side of the car is an unobtrusive steel cylinder from which the gas is fed to the engine and which furnishes it with its motive power.

Owing to the abnormally high price of petrol or gasoline and to the urgent need of saving every ounce of that liquid fuel for the use of motor vehicles and motor transport, motorcars operated by artificial gas have come into wide and steadily growing popularity in the British Isles in the last two or three months. There is, of course, no chance of their displacing gasoline-run cars in the United States under present conditions or so long as gasoline does not mount up around the 30-cent-a-gallon mark.

In order, however, to show the American people the mechanical possibilities of automobiles driven by artificial gas and also to be prepared for any emergency the war may bring about, the Consolidated Gas Co. recently set its expert engineers the task of producing a motorcar that would operate smoothly and successfully with the same convenient fuel that New Yorkers use in lighting their homes, and in cooking their meals. The smart-looking gas-driven Cadillac limousine that made its bow to the motor world in this city last week is the result.

Details of Equipment.

The car selected by the gas company's experts for changing over to the new form was one of a number of passenger cars which have been in the company's service for some time. Its total weight was about 4,800 pounds and its average running ability was about six miles to a gallon of gasoline. To the running board of the limousine was fitted a steel tank of eight inches internal diameter by 45 inches long.

New York Consolidated Gas Co. Car Propelled by Manufactured Gas.

This tank is provided with two one-half inch connections, one for charging and the other for delivering the gas to the carbureter. On the delivery line are placed a high-pressure regulating valve and gauge, so located that the chauffeur can conveniently adjust the regulator from the driving seat. The steel gas container is charged with gas at approximately 100 pounds pressure. While on this particular car the gas container is placed along the running board, there is no reason why it could not be, if desired, placed with equal advantage on the rear of the car, or of any other car which it might be desired to change over to the artificial gas method of operation.

Gas Required for Operation.

The experiments which William Cullen Morris, constructing engineer of the Consolidated Gas Co. of New York, and his assistants have made with New York's first car to be operated by artificial gas have shown that, roughly speaking, about 226 cubic feet of gas would ordinarily be required to do the work in motor propulsion of one gallon of gasoline. In the case of this particular limousine, however, which weighs 4,800 pounds, it has been found that 273 cubic feet are the equivalent of a gallon of the liquid fuel. Far greater efficiency would be obtained with a compressing plant specially built and a motorcar specially equipped. The mileage of a car running on artificial gas would depend largely, of course, on the quality of the gas, and with an increase in the pressure of the gas in the container up to around 1,800 to 2,000 pounds, a good many miles could be covered on a single trip without refilling the tank.

In England, where the price of petrol or gasoline has now soared up around $1.00 a gallon, due to the war pressure, cars of nearly every sort, from the heavy motor lorries to light parcel vans, passenger cars and the like, have been equipped for artificial gas and are in daily use in all parts of the country. This has released for army and navy use great quantities of gasoline that were sorely needed.

English experts are daily coming to believe that there will be no great drop in the price of petrol after peace is declared and that motor propulsion by artificial gas, seized upon as a war-time expedient, is a development of lasting economic expediency.

In Dawes Hotel

Gas an Efficient and Economical Servant in Chicago Memorial

The economies and other advantages of gas service are vividly displayed in the installations now operating in the Mary Dawes hotel in Chicago. This splendid institution is one of the famous group of Dawes memorial hotels erected by Charles G. Dawes. It is well known that the purpose of these hotels is to supply comfortable and respectable lodging places and good, wholesome food to guests at the lowest possible expense to them. Therefore, the fact that gas is used for all of the cooking in the Mary Dawes hotel, as well as for the clothes dryer, dish washer, and the lighting of the lobby, office, dining room and halls, is sufficient evidence that Mr. Dawes and his hotel managers regard gas fuel and gas lighting as the most economical that could be installed, consistent with good kitchen service and efficient, dependable illumination.

When it is stated that this hotel and its mission is a memorial to Mr. Dawes' mother it will be readily understood that these gas installations are not there merely because they are economical, but because they are a part of a general equipment that was chosen for service, for that is the principal aim for which Mr. Dawes designed his memorials, particularly this one.

The Mary Dawes hotel is strictly for women. It was opened in February, 1917, and Mrs. Elizabeth Haines is superintendent. In the first four months of its operation the total cost of gas for lighting was $176.66. The total cost of gas for fuel was $192. The hotel in that time showed a profit of $911.38. The annual profits are of course put back into hotel improvements. The usual rate for rooms at the Dawes hotels is 5 and 10 cents per day, with coffee 2 cents, soup 2 cents, rolls 1 cent, doughnuts 1 cent and pie 3 cents.

Mary Dawes Hotel, Chicago.

Dining Room, Mary Dawes Hotel, Showing Gas Lighting.

Parlor, Mary Dawes Hotel, with Gas Floor Lamps.

Some idea of the manner in which this hotel is conducted may be had from the following letter written by Mr. Dawes to the hotel employees shortly after it was opened:

"So much has been printed about the Mary Dawes Hotel that is calculated to mislead prospective guests and create wrong impressions that my brother, Henry M. Dawes, who is my associate in the enterprise, and I desire to make this statement regarding its purposes. We are simply hotel keepers, and the Mary Dawes Hotel is nothing but a hotel run as a first-class, respectable place, differing from other first-class hotels only in its cheaper prices. Since our guests pay for our service, we assume no right as hotel keepers to inquire into their private affairs. There is nothing in the fact that one becomes our paying guest, either in our hotels for men or for women, which should subject him or her to any other restric-

tions than if a larger rate per day were being charged. We wish to assure our patrons that so long as they are orderly and deport themselves properly while in our hotels, their independence will not be interfered with, nor will they be affronted by unasked advice or interference in their private affairs. At the Rufus Dawes Hotels at Boston and Chicago, in the last three years, we have registered and cared for over five hundred thousand guests and we claim that no hotel charging fifty times their rates is better order observed or greater appreciation of others shown by guests.

The purpose of the Mary Dawes Hotel will have failed if it does not demonstrate that our women guests, in all the finer essentials, are the equals of our guests at the men's hotels; that they as fully resent unwarranted curiosity in their private affairs; that they as fully appreciate independence; that they as fully appreciate respectable surroundings and the respectable deportment of others—in other words, that as a whole they will match respectful treatment with respectable conduct. In conducting the hotel, please keep these general principles in mind."

GAS LIGHTING.

Some of the Points To Be Remembered in Conducting Your Campaigns.

In estimating your opportunities for gas lighting and preparing your compaign plans to secure this important class of business, it will be well to bear in mind the following points:

1.—Every class of consumers—business, factory and domestic—are prospects for good light; and gas light has been enthusiastically endorsed by the largest and most modern establishments—witness, Chicago, Philadelphia, and other big cities where gas lighting has been intensively cultivated.

2.—Play up the special advantages which gas offers for various occupations. Where eye strain is a factor, argue the harm of too great an intrinsic brilliancy and too little light. Such trades include printers, engravers, lithographers, garment makers, flower makers, designers, jewelers, ribbon manufacturers, silk weavers, dyers, proofreaders, cloth manufacturers, cloth inspectors, artists, makers of small objects, etc. Housewives and office workers should be approached on the comfort and health pleas. Manufacturers will respond to arguments for increased production and decreased spoilage.

3.—Scrap your antiquated fixtures and *sell only the modern* styles. Eliminate every open flame burner in your territory.

4.—The gas lighting business is an all-year proposition.

5.—In many communities more homes are piped for gas than are wired for electricity, and there are thousands of homes having no electrical wiring whatever, all over the country.

6.—Conversion of present slovenly appearing installations into neat ones will make it easier to sell new ones.

7.—Canvass and tabulate all your prospects, and tackle first the larger, more inviting and more elaborate prospects which will serve as illustrations to refer to in your subsequent canvassing.

8.—A lighting campaign will stimulate the sales of all your other gas appliances.

9.—Take special pains with your display of lamps and fixtures in both the salesroom and show window. Get original and striking effects and change the displays frequently. Use lots of light. That's what catches the public eye.

10.—Use liberal space in your local newspapers, employing cuts which the manufacturers will be glad to furnish, and any special illustrations you may be able to get. Pictures count big, if they are up-to-date and displayed in attractive space. Be sure, too, that your local reporters get stories about your interesting new installations and exhibits. Good reporters always are hunting news items and it will pay you to cultivate them.

11.—Keep your salesrooms open of evenings whenever the other merchants are open, and state your hours in your advertisements.

12.—Pave the way for your solicitors with a mailed folder or form letter two days before the salesman is due to cover that particular territory.

13.—Pay your convassers a sliding scale of commission. They will thus get what they earn and a substantial incentive is provided for the more ambitious and aggressive.

In these days when mantles are coming into general use and artistic fixtures, lamps, bowls, shades, etc., are available, the public is learning rapidly to appreciate gas light. Your opportunities in this branch of your business are much better than ever before, and sound business principles urge that you make the most of them. Chart herewith from page 31 of "Gas, the Modern Home Light," will be found conclusive argument in many cases as it shows impressively the relative costs of producing a given amount of light by various illuminants at the usual prices: Candles, 12 cents per pound; kerosene, 15 cents per gallon; gas, $1 per thousand cubic feet; electricity, 10 cents per kilowatt-hour. The solid lines represent cost of fuel or of current, the shaded parts the cost of the mantles and bulbs. When prices are different from those given, costs will be correspondingly different.

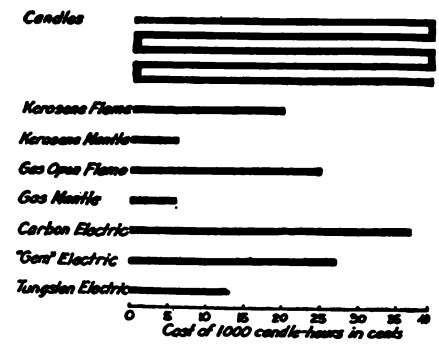


Diagram of Relative Costs of Lighting.

The United States Bureau of Standards in its circular No. 55. "Measurements for the Household," shows the relative costs of producing 1,000 candle-hours of light from various sources. Included in this data is energy cost and cost of replacements of mantles or electric bulbs. The illuminants considered and their costs are as follows:

Candles	$2.00
Carbon electric	.355
Gem electric	.26
Gas—open flame	.24
Kerosene flame	.19
Tungsten electric	.13
Kerosene mantle	.06
Gas mantle	.06

SALES-DEMONSTRATORS.

Advantage of the Combination Shown In This New Jersey Instance.

As an example of what can be accomplished by demonstrators during special sales periods, is given by "Service," Journal of the Public Service Gas Co. of New Jersey. During Gas Range Week, May 7th to 12th, Miss A. G. Morris, demonstrator, Burlington district, sold 30 ranges and miscellaneous appliances, amounting to $842.50. During Water Heater Week, June 4th to 11th, she sold 4 cabinet ranges, 27 water heaters and one Ruud water heater, amounting to $720.80 During Lighting Week, October 8th to 15th, she sold 77 fixtures, lamps, domes and appliances, amounting to $547.64. This makes a total of $2,110.94 in sales for the three special weeks, and being with but few exceptions, better than what was accomplished by any of the regular representatives in the whole division, it indicates what can be done by demonstrators who are given the privilege of making sales, either during special periods or in the performance of their regular work.

Gas-Fired Furnace Facts

Advantages and Disadvantages of the Several Types of Central Unit Warm Air Systems Explained and Illustrated by A. G. I. Committeeman

By F. R. Hutchinson

The subject of warm air house heating is becoming more and more interesting to gas companies, particularly in the present situation when coal and other fuels are exceedingly scarce and are to be obtained at high costs. The problem of utilizing gas in warm air house heating is therefore of greater interest at the present time than it has ever been, and perhaps the results of considerable research made in this field will prove valuable at this time. For many years I have made gas house heating a speciality through the middle west territory and I believe I am as thoroughly acquainted with this subject and its application as any factor in this field. The following data was compiled in response to a request from a committee of the A. G. I., of which committee I am a member.

Gas Fired Hot Air Units.

Warm air heat, using gas as fuel, can be obtained in three ways, namely:

Fig. 3. Showing Course of Fire Travel.

Through gas burners installed in coal designed warm air furnaces; gas designed warm air furnaces; through warm air furnaces designed to burn both gas and coal.

Burners in Coal Furnaces.

Burners may be fitted in coal furnaces in many ways. Probably the one illustrated and described here is found in more general use than any other, in territorities supplied with natural gas.

The illustration (Fig. 1) pictures a coal furnace fire pot with radiator

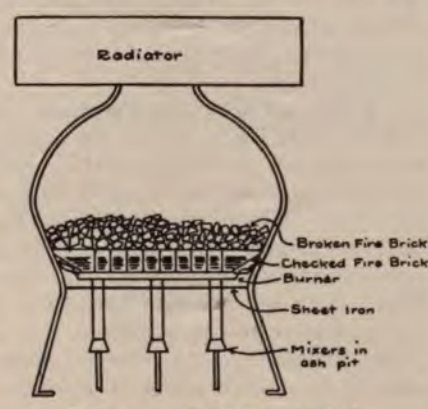


Fig. 1. A Coal Furnace Pot.

above it. To make such an installation, coal grates must first be removed. Cut out and install a sheet iron plate (about 18 gauge) to not too snugly fit in fire pot on grate rests. Holes somewhat larger than burner tubes should be cut in plate to allow burner supply pipes to pass through. The small opening at sides between plate and fire pot and openings around burner tubes will admit sufficient secondary air to support combustion. A sunflower type of sectional burner of two, three or four sections may be used, whose diameter is somewhat smaller than fire pot at point where burner is installed.

Whole fire brick should then be laid on top of burner in center and checked brick laid around edge of fi pot, one end resting on burner, the other against fire pot to deflect heat against sides of fire pot. Later, broken fire brick may be thrown in to help maintain a high flame temperature and retard escape of heat. Enough broken fire brick should be used to bring top level up to three or four inches of bottom of fire door.

Independent Gas Furnaces.

The illustration (Fig. 2 and 3) pictures one style of what might be termed

Fig. 2. Exterior View of Direct Warm-Air Furnace, Cased.

a direct or independent gas designed warm air furnace. Its interior consists of two "D" shaped cast iron burners, cast iron fire pot and three heavy sheet steel radiators fitted with tubes through them to add to radiating surface. Fresh cool air enters furnace casing at bottom, passes around fire pot and through and around radiators and is heated by radiation from fire pot and radiators and conveyed through cellar pipes connected from top of furnace to wall pipes and registers to upstairs rooms.

The products of combustion are contained inside fire pot and radiators and conveyed through flue pipe to chimney.

Dual Fuel Gas-Coal Furnace.

This illustration (Fig. 4) pictures a new type of warm air furnace in which gas or coal may be used separately or together. Its interior really consists of two separate units, one for coal and one for gas, distinct from each other, so both can be burned at one time, if desired. The coal part consists of an ash pit, grates, cast iron sectional fire pot and heavy steel radiator.

The advantages and disadvantages of these three systems may be summarized as follows:

Burners in Coal Furnaces.

ADVANTAGES: Cheapness of cost of installation—burners like these can be furnished and installed for about $25 in an eight-room house size coal furnace.

DISADVANTAGES: Expensive to operate, chiefly because of short fire travel in coal furnaces. Distance ranges from five to twelve feet. Approximate efficiency from 35% to 45%. Operating cost from 20% to 33⅓% more than gas designed furnaces.

Independent Gas Furnaces.

ADVANTAGES: Comparatively low operating cost, because of long fire travel and large radiating surface. Fire travel usually ranges from 25 to 40 feet in length. Approximate efficiency from 60% to 75%.

DISADVANTAGES: Cost of installation considerably greater than burners in coal furnaces. Eight-room house size gas furnace costs consumer, installed, without cellar pipes, wall pipes or registers, approximately from $70 to $125.

Dual Fuel Gas-Coal Furnaces.

ADVANTAGES: Rather low operating cost, only very slightly in excess of direct gas furnace. Ease of change from one fuel to another. Gas may be used fall and spring, coal or coke in mid-winter, without change of any kind. Both gas and coal or coke may be used at one time if desired.

DISADVANTAGES: None, except cost of installation which to consumer for eight-room house size would amount to about $140.

Gas Auxiliary to Central Units.

Auxiliary warm air heat, utilizing gas as fuel, may be produced in two ways, under this heading: Through gas designed furnaces set beside and connected as auxiliary to coal furnaces; through dual fuel, gas-coal furnaces.

Auxiliary Gas Furnaces.

Illustrations following (Figs. 5 and 6) picture two of the many styles of gas furnaces attached at and connected to side of coal furnace.

ADVANTAGES: The utilization of either or both gas and coal, separately or together. Without disturbing in any way cellar pipes, wall pipes or registers, auxiliary gas furnaces, side connected, can be attached to present coal

Fig. 4. Gas-Coal Furnace, a New Type.

furnaces in old houses at cost to consumer of from $100 to $125 in eight-room houses.

Two flue pipes are employed, one for gas, one for coal.

DISADVANTAGES: Floor space re-

Figs. 5 and 6. Showing Auxiliary Gas Furnace Attached to Side of Coal Furnace, to Utilize Coal or Gas Separately or Together.

quired in cellar. Slightly higher operating cost where gas is employed because of loss by radiation in conveying heat through side or top of coal furnace to upstairs rooms.

One engineer reports loss of 2½% in efficiency in laboratory test.

Dual Fuel Gas-Coal Furnaces.

ADVANTAGE: Floor space but little greater than with same capacity coal furnaces. Warm air heat conveyed directly from top of furnace to upstairs rooms. Two furnaces in one casing, one for coal, one for gas, each of equal capacity. Burns gas or coal separately or together without change of any kind.

Figs. 5 and 6 illustrate the casing containing the two units, pictures following (Figs. 7, 8 and 9) show separate coal and gas units; and both together with cut-out casing.

DISADVANTAGES: None, except cost, which is higher than either a direct or auxiliary gas furnace—about $140 to purchaser, set up in cellar and connected with gas and flue pipes, but without cellar warm air pipes, wall pipes or registers for an eight-room house.

Summary of Research.

In the selection and purchase of warm air gas designed direct or auxiliary furnaces, the factors, in order mentioned recommended to gas companies are:

Safety,
Durability,
Efficiency.

Furnaces must first be safe to insure operation by inexperienced, careless householders, attached to chimneys having good, bad and indifferent drafts. They must be made with tight seams and joints of good material, heavy enough to withstand years of hard service. They must be as efficient as possible, consistent with safety and durability. The purchaser and user is interested, in order named, in these factors:

Cost of installation,
Cost of operation,
Length of life of furnace.

The approximate cost of installation at present prices has already been outlined. The cost of operation depends upon several things:

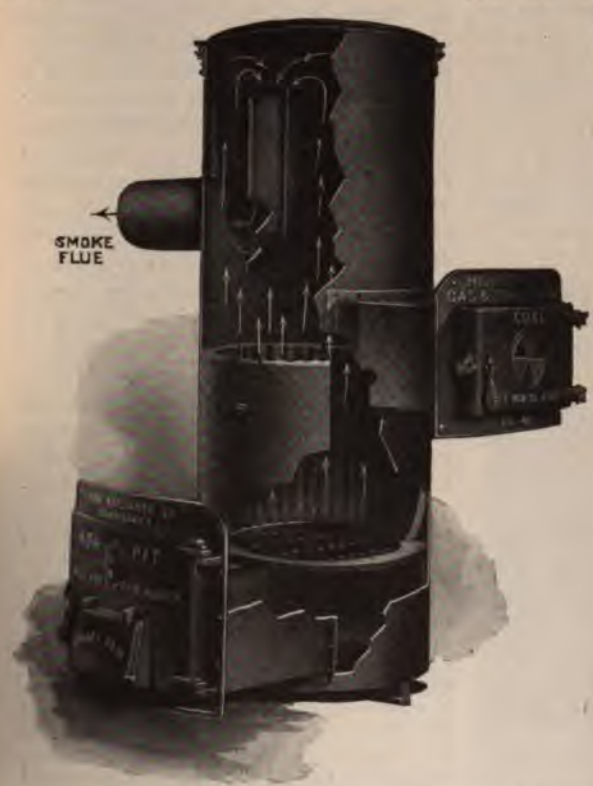
Prevailing temperatures,
Construction of house,
Glass surface,
Exposure,
Heat requirement,
Manner operated,
Price of gas.

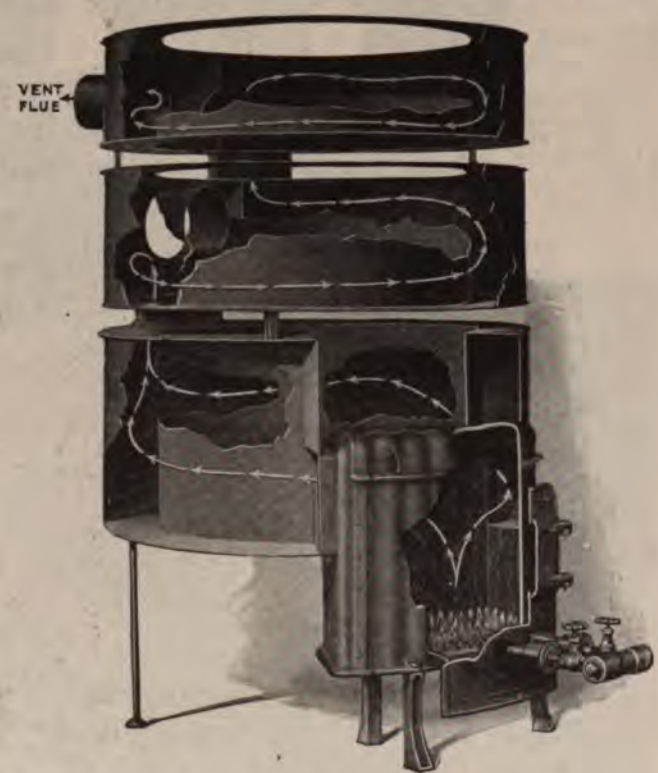
Dealing in generalities, where temperatures fall but slightly below zero, homes of fairly good construction, average glass surface, moderate exposure, heat requirement about 70° F. in daytime, 60° F. during sleeping hours, carefully operated, direct gas designed warm air furnaces provide comfortable heat with about six hundred B. t. u. manufactured gas at thirty-five cents ((35c) per thousand at the ratio of average coal at $10.00 per net ton.

Several kinds of installations were not described in foregoing pages that might warrant mentioning because of good or bad qualities. There are many styles of burners made for coal furnaces that are recommended by manufacturers that have little or no merit, a number of them designed especially because of ease of removal when user wishes to employ solid fuel. Such burners are usually more inefficient than installation pictured. Where an auxilliary installation is made and gas is to be fuel utilized the majority of the time, the gas furnace should be primary and coal secondary, as pictured in illustration (Fig. 10) following.

There are many so called "Combination" warm air furnaces manufactured and sold in natural gas territories. These are usually constructed primarily as a coal furnace and quite useful when solid fuel is used. They are equipped with a gas burner which neither applies heat as it should nor is there any effort made to retain it in furnace. This results in poorly heating the home and extremely poor efficiency when gas is the fuel employed.

Additions to peak load are undesirable. They occasion large investments





Figs. 7 and 8. The Coal Furnace and the Gas Furnace Separate, without Casing, Showing Interior of Each.

SELLING GAS

A BOSTON WINDOW.

Humphrey "Radiantfire" Featured In an Attractive Trim by Emerson.

The Humphrey "Radiantfire" has put the effete city of Boston all in a warm glow. The attractive appliance has been the subject of some lively publicity by the Boston Consolidated Gas Co. recently, and the learned folk of that vicinity have put the seal of their approval upon it and adopted it as though it originated in Boston.

Humphrey "Radiantfire" in Boston Window.

One of the best features of the recent publicity campaign on this subject was the window trim in the Consolidated building. It was the handiwork of Orrin E. Emerson—or rather there were two of these windows by Mr. Emerson. One represented Jack Frost in a background of snow and ice (cotton batting) with a card to suggest the installation of a "Radiantfire" before Jack "gets you." The other, reproduced on this page, shows a bright interior, with a mantel and fireplace in the center. A cat sleeps before the "Radiantfire" and a card with a suggestive verse explains the cat's presence. It says:

"I am the cat, I sleep in state,
But not before a dusty grate,
No cinders mar my fluffy fur,
But in content I sleep and purr
While all around, above, below,
The heater sends its cozy glow."

The window is lined with crimson crepe paper, a dull red tile is around the mantel and the cat is black and white.

Sales of Water Heaters In Illinois Enjoy Big Increase.

Up to the middle of October, the number of automatic water heaters sold and installed throughout the territory of the Public Service Co. of Northern Illinois was nearly 100 per cent. greater than during the year 1916. In some divisions the increase was nearly 150 per cent. and in Division "O" five times as many automatics were sold as were disposed of in the twelve months ending January 1 last. Sales of all water heaters—automatic and the tank types included—have run ahead of the total of the preceding calendar year with over ten weeks yet to be reported to complete the year 1917. The figures included sales by the company's sales department and by plumbers, the former being far in the lead.

Jackson (Mich.) Features "Prevento" In Attractive Window.

One of the most attractive window trims of the season was that of the Michigan Light Co., of Jackson, Mich., featuring "Prevento." This window, as the illustration shows, was decorated with ferns and potted plants in addition to the display of the liquid that "makes old stoves look like new." The bottles were arranged in pyramids, with cards in between to explain the uses of "Prevento." Crowds collected in front of the window while it was working and the company reports a splendid sale of the product. "Prevento" is the new rust preventative put out by the Western Rosin and Turpentine Co., of Bay City, Mich., and it is enjoying a wide popularity throughout the gas industry.

Jackson, Mich., Window Featuring "Prevento."

A CORRECTION.

In the article on gas lighting activities in Kewanee, Ill., in the last issue of The Gas Record, it was stated that there was 15 gas arcs in use there. This was clearly a typographical error and should have read 75 gas arcs. In justice to Mr. Fink and his men this correction is made here and it is to be hoped it will be duly noted by all who read the interesting article referred to.

Public Service Gas Co. Sells 2,530 Heaters in One Week.

During the company's special heating campaign week, October 1st to 7th, a total of 2,530 heaters were sold by the Public Service Gas Co. of New Jersey.

PLUMBERS CO-OPERATE.

All In St. Joseph, Mo. Pool Their Lists and Sell Many Water. Heaters.

The plumbers of St. Joseph, Mo., are to be congratulated on the success of their co-operative water heater campaign which was closed some time ago. In the first place, they are an agreeable lot of men. They agreed that co-operation would sell more water heaters than competition, and the results of their campaign proved this fact. Instead of each plumber having the Pittsburg Water Heater Co. put on a campaign for him, they agreed that by pooling their lists of prospects and having a central display room they could accomplish more.

The Byrne-Powers Plumbing & Heating Co. shop was selected as the central display room and the lists of prospects pooled and duplicates discarded. The Pittsburg Water Heater Co.'s five piece direct-by-mail campaign was then put into operation, supplemented by newspaper and billboard advertising. Two of their Kansas City salesmen were placed at the services of the plumbers to help in the follow-up work.

As the window display at the central room was of great importance, each plumber had his idea as to what would attract the pedestrians, and as a result of these suggestions, the window was dressed well and played its part in the campaign. The results of the campaign were checked up and each plumber received credit for the sales made to the list of prospects that he furnished. This campaign proves conclusively that the plumbers of a city can co-operate on sales campaigns to advantage, and with this co-operation and the help of the manufacturers they can make more sales than if they work on a competitive basis.

GAS FOR ANNEALING.

Illinois Industrial Engineer Finds Factories Appreciate Its Advantages.

H. H. Clark, industrial gas engineer for the Public Service Co. of Northern Illinois, reports many successful new installations for annealing metals by means of gas. In one large plant in the territory where gas was introduced in an experimental way some months ago, it has completely replaced coke for the purpose, Greater facility in operating has followed and better results in the product have been achieved. "For example," says Mr. Clark in his company's journal, "Lumen," "drop forgings emerging from one stage of their treatment enter immediately on what is termed technically a decline while traveling to the next stage. The adaptation of gas in the heat treatment largely obviates this and in the bargain enables the operation to be newly systematized so that the output is increased. In two other plants the annealing furnace capacity of gas supplied by us, has been increased, in one case three-fold. Special advantages of the fuel in this duty have developed in each of these factories, not the least of which is that it enables the annealing process to be performed in a continuous fashion —a thing impossible when other fuels were used."

"RADIANT FIRE" WINDOW.

Lake Charles, La., Sees One at Night, Will All Other Lights Out.

Manager P. O. Moss, of the Lake Charles (La.) Gas Co., has recently staged a highly successful campaign on the Humphrey "Radiantfire." As he describes it, "no extra effort is required in campaign work or solicitation—they sell themselves." After disposing of eighty-one of these new gas appliances to the people of Lake Charles, Manager Moss decided to tell the other new business managers about his successful plan, so he wrote the following statement for THE GAS RECORD:

"After a thorough test of the Humphrey 'Radiantfire' we were convinced that it was the most efficient and economical gas heater on the market and had no hesitancy in guaranteeing it to our customers for efficiency and small consumption of gas. In other words, they get more heat for the money than from any other kind of gas heater, we feel.

"We are using the newspapers and also advertise in the picture shows and install them under a positive guarantee. When the customer desires, we install them on trial, and will say that we have never had one returned to us that was so installed. Every user of the Humphrey 'Radiantfire' in our city is a booster for it and, with their permission, prospects are taken to their homes to see the appearance of it installed and in use; and when they enjoy the healthful and satisfying type of heat obtained and note their pleasing and cheerful appearance, a sale is invariably effected and another enthusiastic and satisfied saleslady is added to our list. In fact, it requires no extra effort in campaign work or solicitation to sell them, as they sell themselves. We installed one in our show window, lighting it during the evening, cutting out all other lights, which burning in the darkness was very attractive from the street, exciting volumes of favorable comment and admiration.

"We have sold in our little town during this season about eighty of the different styles and have orders now awaiting the receipt of shipments that are en route. We have no hesitancy in saying that we consider the principle, combined with the construction of these heaters about as near perfect, from the standpoint of the users, as can be obtained."

Push Gas Appliance Sales In Stockton (Calif.) Territory.

Gas is beginning to be used extensively for heating purposes in the Stockton (Calif.) territory supplied by the Western States Gas and Electric Co. The company is endeavoring to replace coal furnaces with gas furnaces, beside placing many smaller heating appliances.

Co-operative "Pittsburgh" Window of St. Joseph Plumbers.

Steel Treatment

Improved Application of Gas Fuel Makes Saving in Chicago Plant

By R. W. McCandlish

The Myall-Wallace Co. of Chicago is a concern which does commercial heat treating. It does a large quantity of work for a number of the larger tool makers, auto part concerns, etc. As the heat treatment of steel is the most important step in the manufacture of such articles, the work done by the Myall-Wallace Co. is of special importance now.

The photographs show the installation of No. 1 Premix burners and ratio valves on a large Stewart furnace and a large American Shop Equipment Co. furnace. For the latter (of which they have two) special headers were made for the burner. For the Stewart, however, the standard headers were used and the spuds reamed out to give proper openings. In addition to these three furnaces there is a No. 1 Premix installed on a large National Machine Co. furnace. In this case, also, the original headers were used and the spuds reamed to give proper openings. The installation of the four No. 1 Premix burners and ratio valves displaces a fan blower, belt connected to a five h. p. motor. Four ⅛ h. p. motors are now doing the work originally done with the five h. p. motor. In addition to this saving there is a slight saving in fuel.

Advantages of Installation.

However these are not the principal advantages gained. Quicker heats can now be obtained, furnace atmospheres are more readily adjusted, and a closer regulation of temperatures is obtained. There is one operation on these furnaces wherein

Gas Furnace in Myall-Wallace Plant.

it is necessary to run the temperature of the work up to 1550 degrees F. and then "draw back" to 1200 degrees F. and hold the temperature there for one hour. The flexibility of control obtained with the new burners makes this operation simple, where it has always been difficult before. All this means more and better work. This company is now equipping its shop throughout with this type of burner.

Battery of Gas Furnaces Showing Premix Burners.

Here's A Chance To Sell Gas Tar, Locally.

The manufacturer of an engine burning gas tar is anxious to get in touch with gas companies which want to sell tar suitable for such apparatus. Address your replies to THE GAS RECORD, 20 West Jackson Boulevard, Chicago, stating the amount of tar you will be able to sell and the price you will want for it.

Bristol Gas and Electric Co. Increases Gas Rate.

The Bristol (Tenn.) Gas & Electric Co. put into effect on December 1 an increased gas rate. It is now charging $1.25 per thousand cubic feet. Formerly there was a sliding rate which began at $1.25 and was graded down to $1.00. Another means adopted by the Bristol company to meet the added expense of operation, is the abolition of discounts on bills paid before the 10th of the month. In addition to abolishing the discount, an extra charge of ten per cent. of the amount of the bill will be added to all bills paid after the 10 of the month. Discounts are already discontinued, but the ten per cent. penalty for bills paid late will not go into effect until January 10, 1918. S. M. Vance, general manager of the Bristol company, estimates that the readjustment of rates will increase the gross revenue on gas by between $250 and $300 a month. In announcing the new rates, the Bristol company said: "We regret exceedingly the necessity of discontinuing the practice of allowing a discount on gas, but we are forced to do so for the present until such time as conditions again become normal."

Geo. W. Williamson, Chicago, Reorganizes Several Texas Utilities.

George W. Williamson, of Chicago, is the principal stockholder in the West Texas Utilities Co., incorporated at Abilene, Tex., with capital of $400,000. Mr. Williamson also heads the East Texas Utilities Co., of Marshall, capital of $300,000, just organized. The West Texas Utilities Co. has taken over the properties of the Abilene Gas & Electric Co., the Baird (Tex.) Gas & Electric Co., and the Hamlin (Tex.) Gas & Electric Co. The East Texas Utilities Co. has acquired the holdings of the Marshall Electric Co., the Marshall Traction Co., the Marshall Ice Co., the Jefferson (Tex.) Ice & Light Co., and the Longview (Tex.) Ice & Light Co. Associated with Mr. Williamson are J. M. Dickie, J. F. Meadows and F. A. Matthes, of Alibene and A. Hargrave and Sidney G. Vigo, of Dallas. It is said that the several plants will be enlarged and considerable new machinery will be installed.

OPINIONS *AND* COMMENTS

LOOKING FORWARD

The forecast of Henry O. Loebell, of the Doherty organization's industrial department, in regard to the future development of the gas business, is worthy of serious consideration by the financial and engineering factors of the gas industry. Here is a conservative engineer of ripened experience, whose activities have led him into every section of the country and through every essential phase of the gas industry. He says:

"As the gas business develops, there will be two phases of the situation which we should anticipate. The first of these will be the increase in the domestic demand and the second the increase in industrial demand. As the domestic demand continues to increase, it may reach a point where it will be so great that it will force us to abandon some of the industrial business in order to take care of domestic consumers. Public service commissions will force us to take care of domestic consumers and leave the more lucrative industrial business alone. In the event of a scarcity of fuel for domestic consumption this winter, it may become necessary to use gas for heating and cooking in homes where it is not used at present. This will increase domestic consumption and decrease the amount of gas which can be supplied to industries. The only way to guard against our having to abandon part of our industrial business is to have gas manufacturing facilities enough so that we can supply both the domestic and industrial demand."

Mr. Loebell might go further than a prediction that the demand for domestic gas will force us to abandon the more profitable industrial fields. That condition has arrived. It prevails quite generally over the natural gas field, and in many manufactured gas situations, such as Indianapolis, for instance. There is a distinct impression among the well-informed gas interests that the condition will spread over all gas situations, unless something is done to relieve it.

What is the relief?

Mr. Loebell states it quite clearly. "The only way to guard against our having to abandon part of our industrial business is to have gas manufacturing facilities enough so that we can supply both the domestic and the industrial demand," he says. There is the only way out. These are rather unpromising times, it is true, to attempt to finance and construct new manufacturing equipment, but with the skill and experience of the financial and engineering factors of the industry to tackle it, the problem is not an impossible one to solve, by any means. It is being done in some localities. It can be done in others, even in those where the natural gas supply is diminishing and auxiliary manufactured gas plants are necessary.

The gas industry certainly must meet whatever demands are made upon it. It is in the national interest as well as in the interest of the community and the company that it should.

"There will be no peace in the world until the shrine of the war spirit in Potsdam is shattered and its priesthood is dispersed and discredited forever."—Lloyd George.

The GAS RECORD

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SUBSCRIPTIONS

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ADVERTISING

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Display Advertising—Rates on application. Classified Advertising—"Wants," "For Sales," etc.—5 cents a word per insertion, minimum charge $1.

REASSURES MANUFACTURERS

Reassurances as to the future for manufacturers of so-called "non-essentials to the conduct of the war," are contained in the following telegram from Washington:

"Washington has not yet taken official action on placing certain industries on a so-called essential list and others on a non-essential list. We do not believe that any such action is even contemplated. The situation is that industries which are now working on war munitions, or helping directly or indirectly towards the conduct of the war, are being helped and will be helped in obtaining their raw materials, coal and transportation facilities. After they are taken care of, other industries can have what is left. There has been considerable talk in the papers about the government cutting off certain non-essential industries, but we do not look for any such step. The fact is they know that many industries in the so-called non-essential class are a great help to the government indirectly by means of taxes, etc. They also know that an abrupt wholesale cutting off of these industries would undoubtedly cause a panic. It is certain, therefore, that no radical steps along the line suggested by the newspapers will be taken. Priority orders and other restrictions that will insure materials to the plants working for the government will be necessary from time to time and if the war continues for any great length of time, these restrictions will necessarily multiply, and many industries may find it advantageous to change their line of production. These things, however, always work out in a normal way and while it is well to be prepared for readjustment, there is no necessity for worrying about it too much."

A GREAT TASK.

The food administrator says that in our obligation to feed the allied armies and war workers this winter we have a tremendous responsibility.

Canada and ourselves alone have the surplus food to meet this epoch-making responsibility.

But the necessary supplies can be sent "over there" only by personal food economies of every man, woman, and child in Canada and the United States.

Dollars are not a substitute for food—we can get the food only by intelligent substitution, and sacrifice if need be. The total quantity of food needed to hold the line on the western front must be made up from the individual savings of 120,000,000 people.

RECENT PATENTS

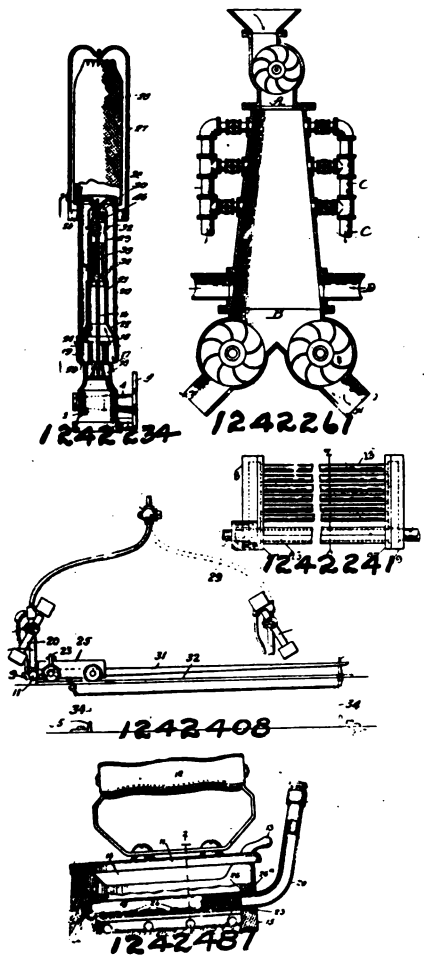
By R. S. McBride, U. S. Bureau of Standards

Patents on subjects of interest in the gas industry were granted on the dates indicated. The page in the Official Gazette of the United States Patent Office of these dates is shown in parenthesis for each patent. Numbers marked thus (*) are illustrated. Printed copies of patents are furnished at 5 cents each by Commissioner of Patents, Washington, D. C.

Patents Issued October 9, 1917.

1,242,234*. GAS-BURNER. Simeon F. Pierce, St. Paul, Minn.

1,242,241*. WATER-HEATER. Robert W. Rogers, Worcester, Mass. In a device of the class described, two sources of heat supply, piping of relatively large diameter exposed to heat from one of said sources of supply, and piping of smaller diameter so connected to the first pipe that fluid to be heated shall pass alternately through one kind of piping and



then through the other, the smaller piping being exposed to heat from the second source of heat supply.

1,242,261*. DISTILLATION OF COAL AND OTHER CARBONACEOUS MATERIALS. Horace G. Stone, Chicago.

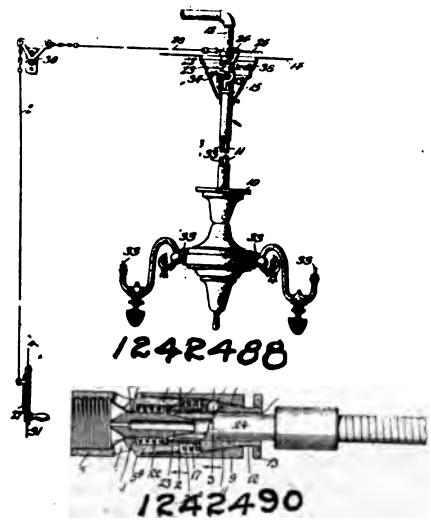
1,242,408*. AUTOMATIC SHUT-OFF FOR GAS-BURNERS. William Musgrave Wood, Philadelphia, assignor to the United Gas Improvement Co., Philadelphia.

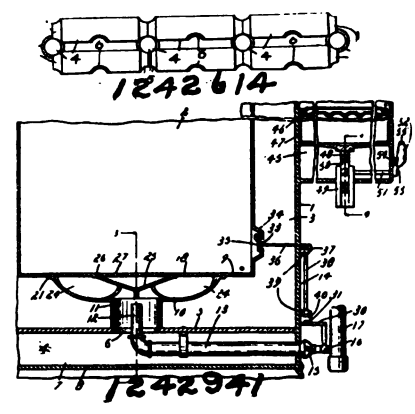
1,242,487*. GAS-IRON. Otto Spahr, Philadelphia, assignor to Strause Gas Iron Co., Philadelphia. A self-heating gas iron comprising a hollow body having an opening in its rear wall and an enlarged recess surrounding same, a burner tube extending through said opening and having a double series of radially extending jet apertures, a mixing tube arranged to screw into one end of said burner tube and forming an annular shoulder therein, a lock-nut adapted to engage the end of said burner tube whereby said burner and mixing tubes are locked together, said lock-nut being adapted to be received in said enlarged recess whereby the said lock-nut is protected against interference and foraminated means in said burner tube extending over the inner ends of all of said jet apertures.

1,242,488*. VALVE AND SIGNAL DEVICE FOR GAS-CHANDELIERS. Adolph Spielman, Philadelphia.

1,242,489. SELF-HEATING SAD IRON. Charles Stichler, Philadelphia, assignor to Strause Gas Iron Co., Philadelphia.

1,242,490*. GAS-BURNER ATTACHMENT. Charles Stichler, Philadelphia, assignor to Strause Gas Iron Co., Philadelphia.



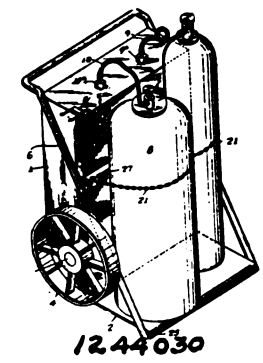


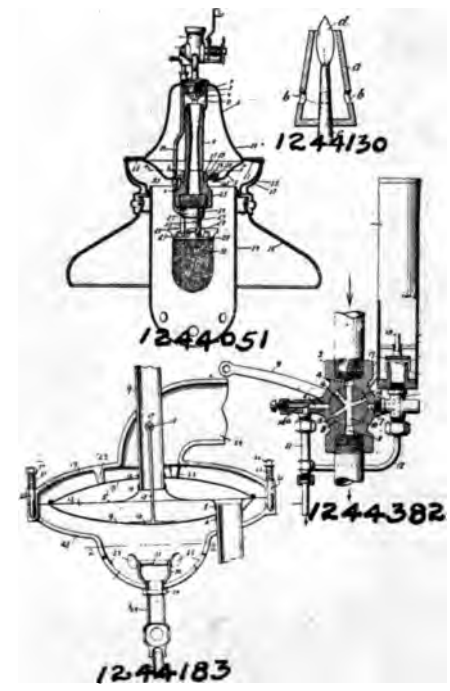
The combination of an air hood, an independent nozzle carried by said air hood and slidably mounted therein, a fuel tube detachably engaging said nozzle and communicating therewith, and means whereby said nozzle and tube are detachably maintained in engagement with each other at the opposed ends.

1,242,614*. CHECKER-WORK FOR REGENERATIVE FURNACES, ETC. Horace E. Smythe, Pittsburgh, assignor to S. R. Smythe Co., Pittsburgh.

1,242,795. PROCESS FOR THE PRODUCTION OF MOTOR-SPIRIT FROM HEAVY HYDROCARBONS. William Augustus Hall, New York.

1,242,796. PRODUCING MOTOR-FUEL. William Augustus Hall, New York.





Patents Issued October 16, 1917.

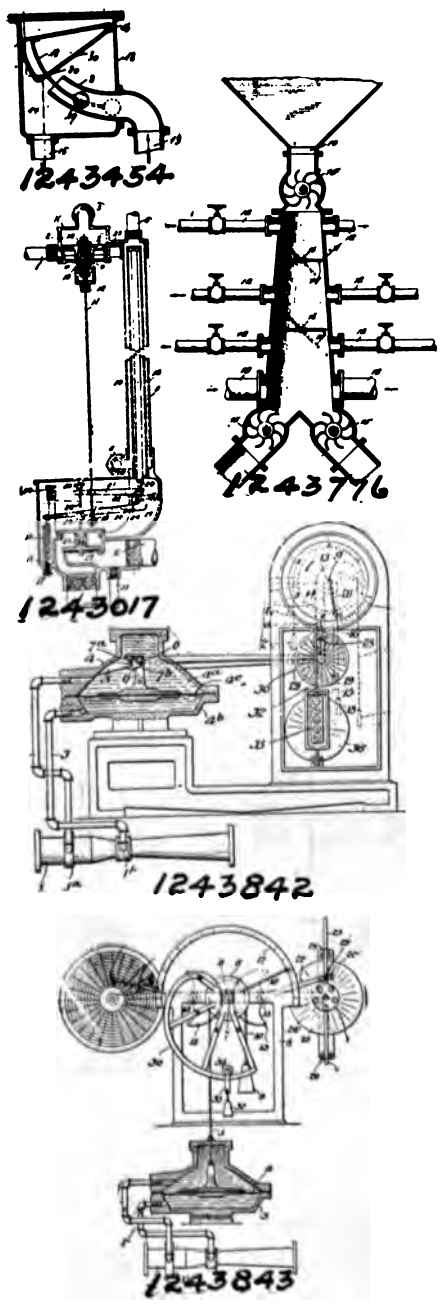
1,242,941*. COMBINATION COAL AND GAS RANGE OR COOKING-STOVE. George W. Howes, Dowagiac, Mich., assignor to the Beckwith Co., Dowagiac, Mich.

1,243,017*. WATER-HEATER CONSTRUCTION. Frank L. O. Wadsworth, Pittsburgh.

1,243,324. GAS-HEATED RADIATOR. James F. Magee and Charles B. Hindon, Syracuse, N. Y.

1,243,454*. GAS-CONSUMPTION REGULATOR. Paul Spaleck, Dessau, Germany, assignor to Hugo Junkers, Aachen, Germany. A device for regulating the consumption of gas, comprising the combi-

nation of a conduit which is curved in the direction of its length, which is tapered i n cross-section from its inlet end toward its outlet end and which is mounted in an upright position with its outlet end higher than its inlet end, and a throttling member movable freely in the conduit without sliding friction and tending always to move by gravity



toward the lower inlet end, whereby the quantity of gas passing through the conduit remains substantially constant as the pressure of the gas varies.

Patents Issued October 23, 1917.

1,243,776*. Coking-Furnace. Horace G. Stone, Chicago. Apparatus for distilling coal or other carbonaceous material including a distillation chamber having an opening located at the upper portion thereof for the passage into the chamber of material to be distilled; means at said opening for preventing admission of an excess of air or free oxygen into the chamber while material is being passed thereinto through said opening, said chamber also having an opening at its base through which coke is discharged; means at said latter opening for preventing admission of an excess of air or free oxygen into the chamber while coke is being passed from said chamber through the latter opening; means for admitting high temperatured gas into the chamber near the base thereof; a plurality of perforated dampers and means for removing products of combustion from the space above each of said dampers; said chamber also having an opening in the upper part thereof through which products of distillation are discharged.

1,243,842*. Fluid-Meter. John W. Ledoux, Swarthmore, Pa. In a meter, the combination of a liquid conduit, means movable by variations of head of liquid in said conduit, and a weight controlled oscillatory cam operated by said means and adapted for producing a variable resistance which effects its movement proportionately to changes of the flow of said liquid.

1,243,843*. Integrating Mechanism. John W. Ledoux, Swarthmore, Pa.

1,244,030*. Portable Gas Welding or Cutting Equipment. Henry Cave, Elizabeth, N. J., assignor to Davis-Bournonville Co., New York.

1,244,051*. Gas-Lamp. Frederick J. Humphrey and Hubert R. Humphrey, Kalamazoo, Mich.

1,244,130*. Pilot-Light for Gas-Burners. Louis Rasch, New York, assignor of one-third to George W. Dickerman, New York.

1,244,183*. Water-Heater. John B. Dudley, Detroit, assignor of one-fourth to William A. Atkinson and one-fourth to Fred Knapp, Detroit.

1,244,226. Pressure-Regulator. Jules P. Metzger, Carlstadt, N. J., assignor to the Leslie Co., Lyndhurst, N. J.

1,244,246. Combined Coal and Gas Range. Soren C. Rockman, Philadelphia.

1,244,275. Composition for Making Fire-Brick and Furnace-Linings. Robert R. Zell, Birmingham, Ala., assignor to Siliconite Refractories Co., Irondale, Ala. A refractory composition containing "siliconite."

1,244,382*. Gas-Lighting Fixture. Victor H. Slinack, Philadelphia, assignor to Pennsylvania Globe Gas Light Co., Philadelphia. In a gas lighting fixture the combination of a pilot burner supply, a gas reservoir in communication therewith, and a quick opening check valve for the reservoir.

Airplane Parts Being Made By Automobile Manufacturers.

Some time ago the aircraft production board evolved a plan to enable makers of automobiles to carry on the production of airplane parts and motors in lieu of their usual volume of peace-time work and today several makers who were awarded contracts now are actively engaged in making airplane parts, accessories and motors. Prominent among the companies now doing work of this kind are: The Buick Motor Co., Flint, Mich., which has been awarded a large contract to produce LeRhone motors, and the General Vehicle Co., Long Island City, which is to construct Gnome rotary motors. The following companies are typical of those to make liberty motors or liberty motor parts: The Trego Motors Corp., New Haven, Conn.; The Ford Motor Co., Detroit; the Nordyke & Marmon Co., Indianapolis, and the Hall-Scott Motor Car Co., Oakland, Cal. The contracts awarded to the foregoing companies as well as those held by the Westinghouse Air Brake Co., Wilmerding, Pa., The Standard Aircraft Corp., Plainfield and Elizabeth, N. J., and others have been productive of inquiries for equipment. But the majority of these companies had been engaged in work of a similar nature previously and did not require initial equipment, but supplementary equipment.

A WAR LESSON.

Illuminating Standard and Consequent Lack of Gas By-products Helped Germany.

The private bill authorities, who think it is a patriotic thing and in the national interests that they should restrict the operations of the gas industry in respect to secondary products, might make a mental note, says the London Gas Journal, of the following extract from an article on "The Future of Benzol" that appeared in the last issue of the "Engineer:"

Attention was first drawn to the more effective use of the benzol resources of gas-works in this country some five years ago; but at that time practically the whole of the gas concerns were subject to penalties based on the illuminating power of their gas, so the proposals then put forward received very little encouragement. This attitude, no doubt, was particularly pleasing to Germany; for there is now no question that she had been accumulating enormous stocks of trinitrotoluene in readiness for emergencies—a fact which explains her growing reluctance to export this product during the couple of years which preceded the war. At the outbreak of hostilities the available stock of trinitrotoluene in this country was ridiculously small; but, as a result of concentrated effort, the country, when consideration is given to imported supplies, can now boast of having surpassed the resources of enemy powers.

The "concentrated effort" has been in the gas industry, the coking plants before the war producing benzol as part of their ordinary operations.

Field for Benzol After War

British Engineer Sees Big Demand for This Product as a Motor Fuel—Discusses Common Problems in Operation of Light Oil Recovery Plants

Some interesting and valuable information on the recovery of benzol and toluol are contained in a paper read at the recent meeting of the Manchester District Junior Gas Association by J. H. Clegg of the Blackburn, England gas company from which the following is taken:

Our plant consists of a 25-ton per day capacity Hird continuous patent, erected by Messrs. W. C. Holmes & Co. The plant consists of a rectangular still, 12 ft. by 7 ft. by 3 ft. 6 in. placed on a brick substructure which can be made into an oven if required. The still is made of mild steel plates, and is heated by coal gas; seven heating tubes passing longitudinally through. These tubes pass into a main flue, and thence to a chimney controlled by a damper; so that we have sufficient pull to prevent smothering the flames. Special silica tubes are fixed at the ends of the heating tubes internally, to protect the latter. The oil traverses the bottom of the still laterally, to and fro around baffle plates, until it reaches the outlet; a depth of oil of one foot being maintained in the still. A dephlegmator is fixed, and was at first intended to act as a primary condenser, water cooled; but in that capacity it has not been required. The hot oil passes through four tubular heat interchangers; the first two being cooled by the incoming oil, the others being cooled by water. The vapors pass to a water-cooled condenser, 5 ft. 6 in. diameter and 9 ft. 6 in. deep, and thence to a separator, where the benzol and water are collected in drums. Two boiler tanks A and B contain the debenzolized and benzolized oil respectively; the former on the ground level and the latter higher than the still from which the oil flows by gravitation into the still. The oil is pumped directly into the washer, continuously—a sight feed, of course, being obtained—and flows back into a cast-iron underground tank to be pumped into the tank B. The accompanying sketch of the plant illustrates more clearly the system of circulation. The plant was arranged, when erected, to be used as a tar dehydrating plant, if wished.

The scrubber-washer is of Holmes's rotary brush type and is of 4,000,000 cu. ft. a day capacity, in two sections; the first section being used as a clean water washer, and the second section (consisting of six chambers) for benzol washing.

In starting, we had difficulty at first in distilling over any benzol at all; the plant being in the open and in an exposed position. We therefore enveloped the still with four inches of boiler covering composition; also the return pipe from the dephlegmator and the vapor pipe from the dephlegmator to the condenser were covered. We found it advisable to make the cover plate of the separator gas-tight and run a small pipe from it to a small oxide purifier; otherwise the plant is both obnoxious and dangerous to the attendant. A small seal filled with water is fitted on this pipe, which will blow if any back-pressure obtains.

Creosote for Washing Gas.

Our washing medium is creosote; we commenced with sufficient to fill the still, scrubber, and half fill tanks A and B. We began working the plant in May this year, and in August we added a further 2000 gallons to replace some loss we had sustained by the fracture of an oil-pipe passing under the permanent way. This addition improved our results. The following are my tests of these two creosotes.

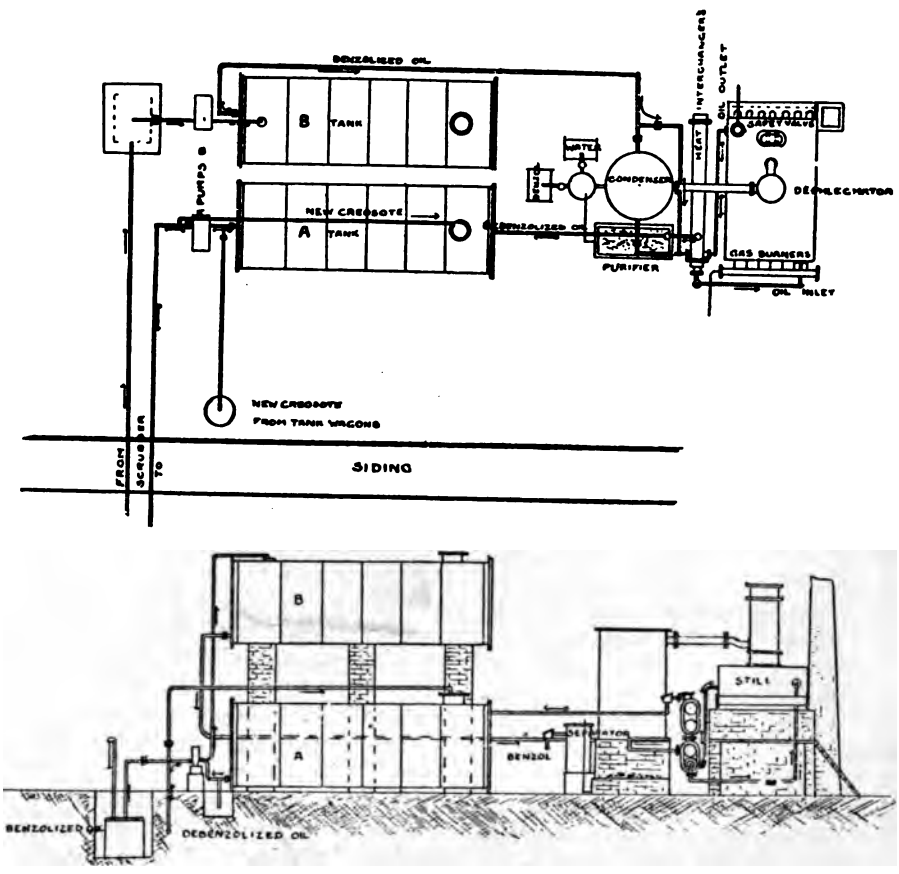


Diagram of Benzol Recovery Plant at Blackburn, England.

No. 1.

Specific Gravity, 1.034.

H_2O	2.5 per cent.
To 120°	3.5 per cent.
200°	68.5 per cent.
250°	83 per cent.
300°	97 per cent.
Residue at 300°	3.0 per cent.

Of the above, $C_{10}H_8$ 3.77 per cent. by wt.

No. 2.

Specific Gravity, 1.911.

H_2O	1.5 per cent.
To 190°	nil
200°	5 per cent.
210°	12 per cent.

220°	30	per cent.
240°	50	per cent.
250°	63	per cent.
260°	76	per cent.
270°	82	per cent.
280°	86	per cent.
290°	90	per cent.
320°	95	per cent.
Residue and loss	5	per cent.

Of the above, $C_{10}H_8$ 4.83 per cent. by wt.

The latter creosote is by far the better of the two. The naphthalene content, although rather high, has not troubled us, nor have we had trouble with water in the purchased creosote, nor from any water picked up in circulating. On starting the plant, however, a little water having leaked through one of the steam cocks during the previous night, caused frothing over. This defect was soon remedied. A little water held in suspension in the oil will cause no trouble, but free water at the bottom of the still will certainly cause frothing of the oil. Both creosotes mentioned were specially prepared for benzol extraction.

Selling Benzol to Manufacturers.

We sell our crude benzol to chemical manufacturers to a standard of 65 percent distilled over at 120 degrees C., with a reduction of one-fourth of a cent per gallon in price for each one percent below this standard in quality. Under protest, we are obliged to use the trade test defined by the chemical manufacturer as follows: 100 c.c. of the crude benzol are distilled in a 200 c.c. glass retort with a long tubular and a small water condenser or a long tube for condensing, with the thermometer bulb placed in the liquid to within ¼ in. of the bottom in the retort. Naturally, the result of the test is lower by four to five percent than if the thermometer was in the vapor, and by distilling in a flask, with a small fractionating column, as much as 12 percent. The highest priced constituent, toluene, often exists to a greater percentage in the lower grade crude benzol than at the standard quality; so under these conditions the chemical manufacturer wins.

I think it would have been infinitely better if the munitions department had formulated details of the quality of benzol required for the price fixed, and a standard sale test specifying sizes of glassware, thermometer, and its position. Some analyses of our crude benzol are given below—two tests from an outside source, and the other two I have obtained myself.

	Sample No. 1	No. 2	No. 3	No. 4
Sale test	55%	62%	58%	50%
Specific gravity	.872	.876	.876	.869
CS_2		.1%	.4%	.06%
Paraffins to fraction 140°	8.0	5.9	7.9	5.93
Benzene	39.6	26.6	40.8	35.21
Toluene	16.8	21.3	17.6	18.31
Solvent and heavy naphtha, approximate		19.0	9.3	22.89
Loss on alkali washing to fraction 170°		7.7	9.6	1.20
Loss on acid washing to fraction 170°		7.7	9.6	2.00
Substances boiling above 170° in distillate up to 170° after washing		5.4	5.4	1.20
Fraction of original above 170°		13.9	8.8	13.2

The chemical manufacturer is thus paid on the assumption that the percentage of toluene decreases proportionately as the percentage of distillate over at 120 degrees. The above analyses show that this is not so. But as the analyses fluctuate so considerably, it can be seen that it would be a laborious method to base the price on the value of the constituents as ascertained by a laboratory analysis of each consignment, particularly as the laboratory analysis would no doubt differ greatly from the actual working results. Perhaps the payment could be based on the actual products obtained by the chemical manufacturer, which would undoubtedly be fairer to both parties, particularly considering the variations in paraffin content.

Objection to Paraffins.

As most of our members know, chemical manufacturers offer great objections to benzol containing a percentage of paraffins greater than four to five percent as they cannot be separated from the toluol, and will not nitrify during that process. By experience, we have found that our best working temperature of the still is from 265 degrees to 275 degrees Fahr. at the outlet—this producing the greatest quality of the required quality. If the quality is rather too good, this is reduced by admitting a little steam at one of the six steam jets which enter the still near the inlet. I have found that just easing the ½ in. valve is quite sufficient—never more than two of the valves being required on together. The action of the steam is purely a mechanical one, agitating the oil more thoroughly—in this way allowing the release of more vapors and assisting these over the still-head to the condenser. Thus, naturally, by decreasing the quality, the quantity is increased. Further investigations are sometimes necessary, however, when the benzol produced is only testing about 48 percent with no steam being admitted to the still and everything appearing to be working under correct conditions. Usually, however, the temperature of the gas being washed is the cause of poor quality. As regards the temperature of the oil, we endeavor to keep this a few degrees higher than that of the gas, and in the vicinity of 58 degrees to 65 degrees Fahr. Two months ago, owing to some temporary shortage of condensing plant, the temperature of the gas reached 75 degrees Fahr.; and, strange to say, some of our best days' results were at this temperature.

Results From Scrubbing.

At present we are circulating our wash-oil at the rate of 6,600 gallons per day—giving us a production of 220 gallons per day, taken over a week; thus obtaining a saturation of 3.3 percent. Based on our coal carbonized, this gives us 1½ gallons per ton, approximately, which I understand is about the average for gas produced by inclined retorts, and where one is compelled to use the poor coal of the present day, containing high percentages of water and ash. Contrary to general experience as published, we have not had the reduction in candle power which we anticipated. The reduction in candle power averages 25 percent, as also does the reduction in gross calorific value. We retain on an average half-a-gallon of benzene and toluene in our gas per ton of coal.

In working tests of the wash-oil, I found from 5 to 10 percent of distillate up to 120 degrees in the benzolized oil, and five percent of water held in suspension in the oil. After passing through the still, the oil contains on an average 2.5 percent of distillate up to 120 degrees C., and no water. The variation of benzol in the benzolized oil is caused by uneven circulation through the washer, owing to occasional perversity of the circulating pumps. I can corroborate the statement that the presence of ammonia in the gas reduces the efficiency of the washing for benzol.

The wash-oil picks up sulphuretted hydrogen from the gas to the extent of about 100 grains per 1,000 cu. ft., which, though not producing an efficient liquid purification, certainly helps in a slight degree. The separated water condensed from the still, containing the bulk of this sulphuretted hydrogen, we add to the liquor feeding our Livesey washer —thus assisting in extracting ammonia. The sulphuretted hydrogen is recovered finally by an adjoining chemical works to which we send our waste gases from the sulphate plant.

Napthalene Production.

Following upon previous practice, we attached a run-off pipe from the base of the dephlegmator and ran the heavy distillates into a settling pan, instead of passing them back to the still as formerly. We did not obtain the deposit of naphthalene we antici-

pated. Below is the distillation of this product, which can be classed as a naphtha:

4	c.c.	over	at	120° C.
10	"	"	"	140
15	"	"	"	142
25	"	"	"	154
35	"	"	"	165
45	"	"	"	176
55	"	"	"	190
65	"	"	"	200
75	"	"	"	214
85	"	"	"	224
95	"	"	"	244
99	"	"	"	280

Specific gravity, .917.

In fact, in several tests no naphthalene at all was found.

It will be seen by comparison with the test of the original creosote that the two distillations bear a close resemblance. We can produce about 200 gallons per week of this distillate, and have several uses for it on the works and in the district—in the latter instance, for removing naphthalene stoppages. Undoubtedly some of this naphtha is extracted from the gas; and as its production does not appear to reduce the benzol output nor appreciably thicken the oil, we remove it for our requirements. We have not as yet had to change any of our wash-oil; but we run off the little tar which accrues in it, from the overhead benzolized oil-tank, by a 1-in. pipe. This tarry portion of the oil amounts to about ten gallons a week, and our total wastage averages approximately 50 gallons per week.

It is interesting to note that the naphtha mentioned contains as much as six per cent. of tar acids, although the original creosotes contained none. The benzol contains no tar acids. Naphthalene troubles, I understand, have been experienced by all engineers who have adopted benzol extraction. The tests which I give below will show that the trouble we are experiencing in this direction is caused by the absorption by the washed gas of naphthalene from deposits of some years' standing; the crystals having even been formed in the internal fittings.

Naphthalene Tests at Meter Outlet.

From starting up the plant in May until Aug. 22, daily tests showed no trace. Aug. 22 to 24, slight trace on three days' test. No further trace from Aug. 24 to Sept. 18.

Sept. 18-19—2.46 grains per 100 cu. ft. of gas
19-20—1.03 " " " " "
22-24—0.97 " " " " "
24-26—0.53 " " " " "
26-27—nil.

From Sept. 27 to Oct. 12 no trace was again found.

Oct. 12-13—Slight trace.
13-15—3.65 grains.
15-16—3.04 "
16-17—2.37 "
17-18—2.14 "

No reason for these spasmodic productions have we found.

The make of gas from our works travels about two miles to our holders and is there mixed with 25 per cent. of water gas manufactured. This water gas has now only a low percentage of carburation. Naphthalene tests taken daily on this mixed gas show that not the slightest trace of this substance is leaving the holders. The little which left our works has been deposited in the independent main or obtained from the syphons.

The following figures will show the rapid growth of stoppages, and strong absorbing powers of the washed gas for this substance. Of course, these stoppages have been enhanced by the weather we have experienced recently —warm days with frosty mornings.

BENZOL FOR MOTOR FUEL.

It behooves every gas works to install a benzol plant apart from patriotic reasons, as I venture to anticipate a great demand for this production as a power fuel, in spite of the fact that gas will undoubtedly retain the field which it is now obtaining as a propellant of motor vehicles. * * * * Let us aim to grasp the whole field of transport either by gas, coke or benzol.—J. H. Clegg.

We are now just commencing to spray the gas issuing to the town with petroleum spirit to the extent of one-eighth of a gallon per equivalent ton of coal carbonized; and by the time this paper is read, we hope to have progressed favorably in the overcoming of this trouble.

Complaints of Naphthalene Stoppages.

May—None.
June—.0017 p. ct. of total consumers per day.
July—.03 p. ct. of total consumers per day.
August—.06 p. ct. of total consumers per day.
September—.14 p. ct. of total consumers per day.
October—.56 p. ct. of total consumers per day.

Reverting to the working of the plant, the gas consumption works out an average of 70 cu. ft. per gallon of benzol produced. This figure will no doubt be reduced when the plant is shielded from the weather. The water required for cooling the oil and condensing the benzol is 70 gallons of water on the basis mentioned. The bulk of this water is required for cooling the oil. At present, we are compelled to use city water; but the bulk of it is elevated afterwards to an overhead tank for coke quenching. Shortly we shall be using river water for this purpose; so that our costs in this direction will be reduced.

Benzol for Motors.

In conclusion, I think that it behooves every gas-works to install a benzol plant apart from patriotic reasons, as I venture to anticipate a great demand for this production as a power fuel, in spite of the fact that gas will undoubtedly retain the field which it is now obtaining as a propellant of motor vehicles. Even compressed gas in cylinders is scarcely adaptable or safe for motorcycles, of which there will be an enormous surplus at the conclusion of the war. Aeroplanes and airships will not by then be conveyances of the future, but will be well in evidence. Let us then aim to grasp the whole field of transport either by gas, coke, or benzol. I have found by personal experience that benzol is more efficient than petrol, if the sulphur impurities are removed, and that the statement that the former coagulates the lubricating oil is not justified if a good quality oil is used. As for the cost of production, we know we can produce this commodity to compete favorably with petrol, for whatever the conditions existing for importation and distribution of the latter, like advantages or disadvantages apply to ourselves.

Railroads Give Preference To Coal and Coke Shipments.

The United States Fuel Administration has been advised that railroads in the eastern section of the country have already taken steps to give preference to the movement of coal and coke and the movement of extra coal and coke cars. Fuel Administrator Garfield has requested the Priority Director to issue a general order giving preference to the movement of coal and coke and empty coal and coke cars.

Eminent Chemists Aid Bureau of Mines on Gases and Explosives.

The following eminent chemists have been named by Sec. of the Interior Lane as a special board to investigate explosives and the use of gases in warfare, acting as advisers to the Bureau of Mines: Dr. William H. Nichols, General Chemical Co., New York, chairman; Prof. H. P. Talbot, head of Chemical Department of Massachusetts Institute of Technology; William Hoskins, Chicago, consulting chemist; Prof. H. B. Venable, University of North Carolina; E. C. Franklin, Leland Stanford University, and Dr. Charles L. Parsons, Bureau of Mines.

Nathaniel Tufts Meter Works

455 Commercial Street

Boston

Established 1860

In New England there are ONE MILLION consumers GAS METERS.

35% or 350,000 are of the *Prepayment Type*

39% of our total meters sold in 1916 were *Prepayment*

We manufacture these under License from John J. Griffin & Company

McDONALD METERS

Noted for Accuracy

CONSUMERS METERS
REGULAR AND B TYPE

PREPAYMENT METERS
ADAPTED TO ALL REQUIREMENTS

STATION METER WORK
OF EVERY DESCRIPTION *with* A SPECIALTY *of*
THE HINMAN MEASURING DRUM

D. McDONALD & COMPANY

991 BROADWAY, ALBANY, NEW YORK

The MARYLAND METER

B. METERS

FOR INCREASED CAPACITY
UNDER SLOW SPEED OPERATION

STATION METERS
METER PROVERS, COMPLAINT METERS, ETC.

ARTIFICIAL AND NATURAL GAS METERS
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BALTIMORE, MARYLAND
SPECIAL ATTENTION TO REPAIR WORK

NORTHWEST REPRESENTATIVES: NORTHWEST GAS EQUIPMENT CO.
1010 SPALDING BUILDING, PORTLAND, ORE.

NEW YORK PHILADELPHIA CHICAGO

AMERICAN METER COMPANY

INCORPORATED

AS the season for gas complaints approaches we wish to call your attention to our New American Service Cleaner, which has been on the market for more than five years and has met with universal approval.

CATALOGUE SENT ON REQUEST

Our apparatus in the Collective Gas Exhibit at the Panama-Pacific International Exposition was awarded the Grand Prize.

AMERICAN METER COMPANY

INCORPORATED

11TH AVENUE AND 47TH STREET - - - NEW YORK CITY

CONSTRUCTION NEWS

Immense By-Product Plant Projected for East St. Louis.

Announcement is made by L. E. Fisher, vice-president and general manager if the St. Louis Coke & Chemical Co., a subsidiary of the American Coke & Chemical Co. of Chicago that the company has accepted one of three proffered sites in the East St. Louis industrial district as a location for a large coking and iron reducing plant. The company expects to make an ultimate investment of about $15,000,000 there, the first units of which will be completed early in 1919. Coke and by-products, including toluol and other explosives, will be produced in large quantities. Mr. Fisher estimates that the output of toluol alone will be 45,000 gallons a year. In addition to explosives, dyestuffs and tar, the company will produce from 15,000,000 to 18,000,000 cu. ft. of illuminating gas a day.

Wilputte Coke Oven Corp. Gets Canadian Contract.

The Wilputte Coke Oven Corp. of New York City has been awarded a contract for the installation of twenty-five Wilputte regenerative by-product coke ovens, with certain by-product equipment, as an extension to the present coke oven plant of the Algoma Steel Corp., Ltd., at Sault Ste. Marie, Ontario, Canada. Work will be started immediately, and the construction is expected to be completed by July 1, 1918.

Big New Gasoline Plant of United Natural Gas Co.

The United Natural Gas Co. is making rapid progress in the construction of a new gasoline plant at Lewis Run, Pa., which will have a capacity of 75,000 gallons daily. More than 50,000,000 cu. ft of gas, from the fields of Jefferson, Elk, McKean, Clarion and Forest counties, will be used daily in the production of gasoline. The cost of the new plant is $150,000.

Gas Service Is Inaugurated at Williamsburg, Ky.

The Raymond Hadley Corp'n, 44 Whitehall St., New York, now has in operation its plant supplying gas to Williamsburg, Ky.

Improvements Proposed by River Bend Gas and Water Co.

The River Bend Gas and Water Co. of Dinuba, Calif., asks permission to issue securities to cover proposed improvements to its plant.

Will Build New Pipe Line To Supply Augusta, Kans.

The city council of Augusta, Kans., has closed a contract for the supply of 500,000 cu. ft. of natural gas daily and a pipe line is to be laid immediately to the field near there.

Immense New Gas Pipe Lines for Carnegie Steel Co.

One of the largest artificial gas-pipe lines in the country is one of two recently awarded by the Carnegie Steel Co. to the T. A. Gillespie Co., of New York and Pittsburgh. The contractor is to make 40-in. lock bar steel pipe and construct 10 miles of line by January. The line will carry gas from the Carnegie Steel Co.'s by-product coke oven plant at Clairton to the Duquesne and Edgar Thompson steel plants of the company, where it will be used for fuel.

New Natural Gas Plant At Oilton, Oklahoma.

The Midfield Gas Co., Box 158, Oilton, Okla., reports that its natural gas plant is now in operation.

United Natural Gas Co. Will Erect New $150,000 Plant.

The United Natural Gas Co. plans to erect a plant at Lewis Run, Pa., to cost about $150,000.

Saxonburg, Pa. Now Has Natural Gas Supply.

The Saxonburg (Pa.) Heat and Light Co., Manager W. H. Knock, has started supplying natural gas.

COURTS-COMMISSIONS

FACING THE FACTS.

Hamilton, O., Learns That Its Municipal Utilities Are Expensive.

Mead & Seastone, consulting engineers of Madison, Wis., find that the municipal plant of Hamilton has suffered an actual loss to the city during the past seven years of $300,000. The condition of the properties, both physical and financial, is very unsatisfactory. While the city's reports for 1916 show a profit of $23,872.03 for the waterworks, and a profit of $34,800.63 for the electric light plant, with a loss of $433.12 for the gas plant, the analysis of the engineers shows that the waterworks lost $11,687 and the gas plant lost $32,344, while the electric light profit was only $22,395. The engineers point out that present conditions are due to lack of co-ordinate action between the operative and legislative branches of the city government, non-observance of the state laws, and a generally bad administrative policy, apparently the result of political conditions, by which authority has been too general and responsibility too much divided.

Reorganization Requested for St. Albans (Vt.) Gas Light Co.

Bondholders of the St. Albans (Vt.) Gas Light Co., represented by E. H. Gay, of Boston, demand its reorganization, the company having defaulted. The People's Trust Co. of St. Albans, trustee, is asked to take possession of the property under the terms of the mortgage.

Want to Abandon Plants In Southern Illinois Cities.

The Illinois Utilities Commission has under advisement a petition of the Wabash Gas Co. to abandon its natural gas plants at Marshall and Martinsville. The company wants to reclaim its property and be released from all claims.

Gas the Cheapest Fuel Even at Domestic Rate.

Although the Kansas Utilities Commission recently issued an order that factories using more than 200,000 cu. ft. of gas a day should pay the domestic rate, many Kansas factories still use gas, as it is cheaper even at the domestic rate than coal, when considering the cost of changing machinery to accommodate new fuel.

Washington (D. C.) Gas Companies Request Rate Increase.

The Public Utilities Commission of the District of Columbia will hold a formal public hearing December 18, 1917, for the purpose of considering the application of the Washington Gas Light Co. for permission to increase the rate for gas furnished both by said company and the Georgetown Gas Light Co. from the present legal rates to $1.10 per thousand cubic feet.

The term of H. K. Morrison, of Lynn., Mass., as affiliation representative of the New England Ass'n of Gas Engineers, on the board of directors of the American Gas Institute, expired October 31st, 1917, and he is succeeded by H. C. Crafts, of Pittsfield, Mass., ex-president of the New England Ass'n.

Blasting Rock

Ninety-Mile Natural Gas Line Being Built in Record Time

Down in Oklahoma, Henry L. Doherty & Co., through its Empire companies, (the oil and natural gas section of the organization) is attempting to lay in four months, from Sept. 10, last, 90 miles of gas main trunk line to new gas fields. This is a job that would ordinarily take more than one year to do. The work is being rushed in order to obtain more gas for towns and cities in Northern Oklahoma, Kansas and Missouri. The work represents an expenditure of $2,500,000.

Installation of 12-in. Line on Hill Side.

The country in which the pipe is being laid is wild and rugged. Part of the pipe is being laid in forbidding hills of the Osage nation and the remainder through the rough, untillable country from Cambridge, Kansas to Dilworth, Okla.

The size of the pipe is 12, 16 and 18 inch. The line from the Osage-Hominy field, which starts south of Bigheart, Okla., passes through a rough country for practically its entire length of approximately 50 miles. The line does not dodge the hills; pipe is too scarce for that. It passes over them, often reaching a grade of 75 per cent. It goes up one hill and down only to approach another which must be passed in a similar way.

The hills are of flint rock over which ditches can be opened only by blasting. Tough jack oaks which must be cleared away before dynamiting begins, add to the construction gang's difficulties.

Must Blast Rock.

Another section of the new line being built from Cambridge, Kan. to Dilworth, Okla., is to be 43 miles in length. A greater obstacle to pipeline construction hardly can be found than the hilly country of southern Kansas and northern Oklahoma. The trench for much of the distance lies through limestone hills, most of which have but a shallow covering of earth and are bare rock in many places. To blast out this rock a supply of 25 tons of dynamite and 140,000 percussion caps were obtained. This will not be enough for already more percussion caps have been ordered. Much of the time more than 1500 men have been working upon this immense gas pipe line job.

TIPS FOR GAS MEN.

British Association Prospers Through the War—Opportunities Never Greater.

Speaking of the great success achieved by the British Commercial Gas Ass'n in spite of burdensome war conditions, Sir Hallewell Rogers, who recently was re-elected president, remarks that notable men of the great industrial and training centers would not support the association with the enthusiasm that they do if there was not "something in it;" nor would gas undertakings representing no less than 82 per cent. of the output of the United Kingdom willingly subscribe to the furtherance of the work—especially in war times—if their administrators were not satisfied with what was being done. The report of the general committee finds that "the income for the year is the best on record." This "record" extends over six years, during three of which most things have been subjugated by the war. In matters of reconstruction as well as of the development of national resources the British gas industry expects to make good reaping. When all these things are considered, the London Gas Journal sees a still more extensive scope for the association, and larger indispensability. What is done in effecting progress at the gas manufacturing end will necessitate at the sales end a broad and live policy—educative, resourceful, and pushful. The experiences that the war has spread as to the uses of gas and coke will require, in order to gain from them the maximum profit in extended business, the application of the association's intensifying influences.

City of Attica, N. Y., Buys Local Light and Heat Utilities.

The municipality of Attica, N. Y., nas been authorized to acquire and operate the existing system owned by the Attica Water, Gas and Electric Co., together with all the latter's appliances, appurtenances, natural gas pipe lines and wells. The price to be paid is $12,000.

Blasting Ditch for Pipe Through Rock.

United Light and Railways Declare Dividend.

The regular quarterly dividend of 1½ per cent. has been declared on the first preferred stock of the United Light & Railway Co., of Battle Creek, Mich. A dividend of one per cent. was also declared on the common stock of the company. Both dividends are payable on January 2, 1918, to stockholders of record at the close of business, Saturday, December 15, 1917. The stock books will close at noon but will re-open at the opening of business Monday morning, December 17, 1917.

Report on Gas and Gasoline

Results of the U. S. Bureau of Mines' Experiments in Casinghead Gas and the Measurement of Natural Gas at High Pressures Announced

In its recently published annual report, the United States Bureau of Mines says:

Important work was done during the fiscal year 1916 on a process for the absorption of gasoline from natural gas. This process consists of bringing so-called "dry" natural gases, which contain a very small percentage of gasoline vapor that can not be handled by the ordinary compression method, in contact with a petroleum distillate much heavier and of higher boiling points than gasoline, thereby causing the oil used to absorb gasoline from the natural gas. This absorption may take place in suitable towers or through a specially designed apparatus for absorbing vapors or gases in liquids. After the oil has absorbed the gasoline from the natural gas it is pumped to a steam still, where the gasoline is separated from the oil by fractional distillation. Then the oil is pumped back through heat exchanges and cooling coils to the absorber to receive another charge of gasoline. In other words, the oil acts simply as a carrier of gasoline from the absorber to the still and is used over and over again. The process is continuous, as the oil traverses a circuit and the natural gas is continually passing into and out of the absorbers. By the process millions of cubic feet of natural gas can be utilized for been considered too lean, the estimated output of gasoline by the process being 100,000,000 gallons each year. The Bureau of Mines did not initiate work on gasoline extraction that hitherto have this process, for one of the large gas companies installed it in 1913, but the bureau is the first body to conduct elaborate experiments for the benefit of the public. These experiments demonstrated the fact that it is not necessary to perform the absorption at pressures above 30 pounds per square inch unless the pressure of the natural gas is high. As many millions of cubic feet of gas can be used at low pressure the bringing of this fact to the public is of great importance. A comprehensive report discussing in detail the many tests that were made is to be published soon.

The bureau's chemists have done further work on the measurement of natural gas at high pressures. Each year in the natural-gas industry many millions of cubic feet of gas are measured under pressures up to 300 pounds or greater, and the assumption has always been made that the gas follows the law for a perfect gas as regards the relation of pressure to volume. This simple law, called "Boyle's law," states that the volume of a gas times the pressure applied to the gas is constant at all pressures. However, this law does not always hold, and the neglect of proper correction for variations has resulted in the erroneous measurement of many millions of cubic feet of natural gas. The Bureau of Mines determined the deviation from Boyle's law for many samples of natural gas, and also for the constituents that comprise natural gas, in order to show the proper correction to be applied in natural-gas measurements. The results of this investigation will be found in Bureau of Mines Technical Paper 131.

Choose Pittsburgh

Natural Gas Ass'n Switches 1918 Convention from Louisville

The 1918 convention of The Natural Gas Association of America will be held in Pittsburgh May 21st and 22nd, and not in Louisville, Ky., as planned This change has been made necessary by the fact that the building in which the convention was to be held in Louisville, has been commandeered by the government as a sewing depot. It is further announced from association headquarters that the usual exhibit by the supply men's association will be eliminated this year on account of war conditions. The following official notice has been sent out by Vice President David O. Holbrook:

"At a meeting of the board of directors of The Natural Gas Association of America, held in Pittsburgh December 1st, a letter was read from C. C. Ousley of the Louisville Convention & Publicity League, under date of September 26th, advising that there must be a change made in the plans for the convention, which was scheduled to meet in Louisville in May of 1918. The government has commandeered the building in which the convention was to be held and is to use it as a sewing depot for the period of the war.

"After a thorough discussion by the board of directors, it was decided that on account of the necessity for economy and the railroad congestion, it would be advisable to hold the next convention without the customary auxiliary convention of the Association of Natural Gas Supply Men, devoting the entire time of the meeting to the discussion of the problem of the natural gas industry.

"Each year the members of the supply men's association spend approximately $75,000 in the expenses of their representatives and the installing of their exhibits. It was thought by the directors of The Natural Gas Association of America that this expenditure was not justified under the present conditions, and a motion was passed recommending to the directors of the Association of Natural Gas Supply Men the elimination of the exhibit feature this year.

"The convention of the natural gas association will be held as usual, although the session will be only two days instead of three. Because of the probabilities of securing larger attendance at Pittsburgh than at any other point, it was decided to hold the convention in Pittsburgh on May 21 and 22, 1918."

Natural Gas Now Furnished To Oak Harbor, O.

The Oak Harbor (O.) Gas Co. is supplying natural gas now, although as yet operating without a franchise.

PROBLEMS IN THE GAS BUSINESS

Conducted by W. M. Henderson, Assistant Engineer Gas Department, Pacific Gas & Electric Co., San Francisco.

ANSWERS TO QUESTIONS.

237—Water Heater Campaign.

What experience have gas companies had with direct mailing campaigns for the sale of automatic gas water heaters? What success? Were letters used or mailing cards and if so were these pieces mailed under regular postage covers or were they delivered by gas company employes?

Answer—Very good success. One of the most prominent manufacturers of gas water heaters has featured for the past several years direct mailing campaigns for several hundred gas companies. They have letters from these gas companies giving the results of campaigns. All in all both the gas company and the water heater company were satisfied with the resultant sales. Both letters and mailing cards were used, being mailed in the city or town by the gas company conducting the campaign. In several instances the gas company delivered the letters or cards by employees. In my opinion such letters or cards do not have the far-reaching effect when so delivered as they would have when delivered through the mails.—C. A. Detwiler, Pittsburg Water Heater Co.

238—Connecting Water Heaters.

What is the usual charge for connecting a No. 65 Pittsburgh, a No. 4, 6 and 8 Ruud, Humphrey or Pittsburgh? Are installations made with a view of making profit on installation work as well as heaters or on heaters only?

Answer 1—The usual charge for connecting No. 65. "Pittsburgh-Bungalow" is from $20.00 to $25.00; No. 4 automatic, $25.00 to $30.00; No. 6 automatic, $30.00 to $35.00; No. 8 automatic, $35.00 to $40.00. The object in using fixed prices on installations is not with a view of making a profit on the work but to assure that as a whole on the year's installation work there will not be a profit or a loss. Some jobs may cost more than the fixed sum, others less; thus it will even itself up.—C. A. Detwiler, Pittsburg Water Heater Co.

Answer 2—Installation charges are made on a time and material basis in each case. A shop charge of ten per cent. is added to both labor and material.

239—Labor Installing Heaters.

How many men would it require to install a No. 4 automatic gas water heater and how long on average reheating job? How long on average direct job?

Two men, one fitter and helper, are required to install any size automatic gas water heater. Not more than one day, eight hours, should be required on any ordinary installation, either direct or reheating.—C. A. Detwiler, Pittsburg Water Heater Co.

This department will supply information on problems arising in every department of the gas industry. Your co-operation is solicited, both in asking and answering questions. Address: W. M. Henderson, Pacific Gas & Electric Co., 445 Sutter St., San Francisco, Calif.

NEW QUESTIONS.

252—Oil vs. Gas.

Will five gallons of crude oil produce approximately the same heating effect as 1,000 cu. ft. of illuminating gas at about 600 B.t.u. per cu. ft.?

253—Test Paper.

Is there such a thing as test paper for detecting the flow of electric current? Can it be used for determining the polarity of the terminals? If so, would it be useful in electrolysis surveys?

254—Checker Brick.

Which is the best way to arrange the checker brick in a generator, to lay them straight up, or to baffle them, that is, to lay one row directly above the opening made by the lower rows? Why?

255—Generator Temperature.

Our generator is of the single shell oil type; the oil burner enters on top five feet above the top course of checker brick. What would be the cause of the brick getting cold on top and hot in the bottom? What would be the remedy?

256—Hydrated Lime.

For what purpose is hydrated lime sold?

240—Sale of Water Heaters.

What experience have gas companies in large cities had with direct mailing campaigns that were not coupled up with newspaper advertising? Could success be expected from campaigns consisting of mailing pieces only, with no newspaper advertising and no special window displays or store demonstrations?

Answer 1—The experience of one prominent manufacturer in two cities of population 600,000 or more, where direct mailing campaigns were put on, shows that sales are more readily made where the gas company used newspaper advertising. Yet, in these same cities the gas company met with success from mailing campaigns only, without featuring special water heater advertising. Of course, special window displays and store demonstrations are links in making a successful campaign.—C. A. Detwiler, Pittsburg Water Heater Co.

Answer 2—A direct mailing campaign without being tied in with other forms of publicity would not pay except in the case of appealing to a selected list of prospects. Even in the latter case personal solicitation would be found necessary to get results. Our experience has shown that excellent results are to be had by the direct mailing campaign when followed up by salesmen.

Answer 3—Results of any importance cannot be expected quickly unless newspapers, literature, display and personal solicitation are utilized in some degree of combination. Without combining these forces in a well directed drive it is likely that results will not be satisfactory from a new-business standpoint, and sales may include a large percentage of replacements and consumers who would have purchased sooner or later in any event. These are undoubtedly of value to the gas company, but the primary object of a campaign is to secure strictly a new outlet for gas on existing mains; in other words, sales to present consumers who are not contemplating the use of water heaters.

From past experience it has been found that a preliminary survey of the community is a great advantage. This can be secured by inexpensive employees, such as meter readers, inspectors, etc. A survey of this kind would indicate all non-users and other information, valuable for all new business work.

Newspaper advertising can be limited to a great degree and depended upon only as general publicity to create interest. Proper literature and lettering tending to create interest can be mailed by using the survey data to those (and only those) who are direct prospects. These then should be followed up by personal calls by the salesmen. The number of pieces mailed and calls back by salesmen will depend upon the scope of the campaign. This plan entails a greater expense than a s impler plan but is justified by the better price which can be secured and its completeness.

In average territory, it is probable that too much time would be required, with consequent loss of revenue, to sell a large number of water heaters by utilizing mailing pieces only.—H. M. Crawford.

241—Results of Heater Campaign.

What per cent. of automatic gas water heater sales are made by direct canvass; by customers calling at office; by prospects secured by mailing literature?

The percentages vary depending on the size of city, population, number of me-

ters in service and class of users; so far, statistics have not been compiled giving any conclusive data. As many commercial agents have expressed it—education is the work that is carried on at all times and sales follow from the most unexpected sources.—C. A. Detwiler, Pittsburg Water Heater Co.

242—Automatic Heater Sales.

Do you believe that the average buyer of automatic gas water heaters can be reached by a house to house canvass?

Answer 1—Yes, that is one method of reaching them, getting such data as will make a prospective list of purchasers for follow up by mail, future calls, etc.—C. A. Detwiler, Pittsburg Water Heater Co.

Answer 2—Yes, if the salesmen have been preceded by a reasonable amount of educational publicity.

243—Price Water Heaters.

What is the usual charge for automatic gas water heaters, list or list plus a fixed installation charge?

Answer 1—List plus a fixed installation charge, in other words, make the water heater department of any gas company a real department—the sale of merchandise at a profit.—C. A. Detwiler, Pittsburg Water Heater Co.

Answer 2—List for cash. Installation charge at cost plus 10 per cent. except in campaign work, where a fixed installation charge is made.

247—Metal Cleaning.

Have you any suggestions for cleaning grease from metal surfaces?

Grease and old lacquer may be removed by boiling in about a 15 per cent. solution of caustic soda. As water evaporates more must be added. Aluminum articles must never be treated in this way and zinc and tin should be allowed to remain in this bath for only a short time, because strong alkaline solutions attack these metals, aluminum very actively. After removal from the bath, the article should be washed thoroughly, preferably in running water, and then immersed in boiling water and allowed to remain until the metal has been fully heated to the temperature of the water. Then it should be removed from the hot water, dried as much as possible with a clean cloth, or most of the adherent water may be removed by shaking it, after which it should be suspended in a warm place until drying is complete. Since the metal is hot the water will evaporate quickly. Rapid drying is necessary in the case of iron articles to prevent corrosion.

Grease may be removed also by dipping in benzol or distillate. A succession of at least three baths should be used, for if only one is employed, it becomes contaminated with the grease and a film of this is left on the article when it is removed from the bath and allowed to dry.

Oxide layers and salts produced by corrosion may be removed by immersion in suitable acid baths. This process is known as "pickling." Rust and scale may be removed from iron articles by immersion in a solution made up of 25 parts of concentrated commercial hydrochloric acid and 75 parts of water. The black scale is not soluble in acid but is removed by acid treatment because the underlying layer of iron is dissolved.

To prepare a "pickle" that will leave the iron article very bright, pour 800 c.c. of concentrated sulphuric acid in 10 liters of water (not the water into the acid) with stirring, and dissolve 60 grams of zinc in the mixture. Then add 350 c.c. of concentrated nitric acid. After removing the article from this "pickle" bathe as explained before.

Copper, brass, bronze and German silver may be cleaned by dipping in the following: Water 40 parts, commercial concentrated sulphuric acid 40 parts, concentrated nitric acid 20 parts, and a few drops of concentrated hydrochloric acid. Articles of the same sort may be cleaned and brightened by dipping in a bath composed as follows: Water 25 c.c., concentrated sulphuric acid 30 c.c., concentrated nitric acid 50 c.c., sodium chloride one gram, lampblack one gram. The articles are dipped in this and washed alternately until the desired surface is obtained.

REPEATED QUESTIONS.

246—Reinforced Concrete.

Will not iron imbedded in concrete corrode?

247—Metal Cleaning.

Have you any suggestions for cleaning grease from metal surfaces?

248—Cements.

Some place, sometime, I have seen a list of various cements for different purposes. Can you refer me to where I can get a copy of same?

249—Sewer Gas.

From time to time we have had complaints from the Board of Works that gas is leaking from our distribution system into the sewers. There have been two explosions recently in manholes, not serious, but it has brought the subject to a head. Is it possible to be manufactured gas, and how does it get in the sewer? What else could it be? What ignites the gas and is there a preventive?

250—Eutectics.

Can you define for me what the term "eutectics" means in speaking of a lead-tin alloy, solder or a combination of such metals as antimony, copper, zinc, etc.?

251—Combustion Products.

Would the products of combustion entering a room be unhealthy; from a luminous flame, from a non-luminous flame?

Gas Associations

American Gas Institute—Indefinitely postponed; meeting place Washington, D. C. Pres., Alfred E. Forstall, New York; Sec.-Treas., Geo. G. Ramsdell, 29 W. 39th St., New York.

Ass'n of American Gas Industries—Third week in February. Pres., John S. De Hart, Jr., Newark, N. J.; Sec.-Treas., Eugene Y. Sayer, 60 Wall St., New York.

Ass'n of Natural Gas Supply Men—May, 1918. Pres., David O. Holbrook, Pittsburgh. Sec., Larmour Adams, 1304 First National Bank Bldg., Pittsburgh.

Canadian Gas Ass'n—August, 1918. Pres., J. M. H. Young, London, Ont.; Sec.-Treas., G. W. Allen, Toronto.

Empire State Gas and Electric Ass'n—October, 1918. Pres., Stuart Wilder, Mt. Vernon, N. Y.; Sec., Chas. H. B. Chapin, 29 W. 39th St., New York.

Illinois Gas Ass'n—March, 1918, Chicago. Pres., F. W. Bedard, La Salle; Sec.-Treas., Horace H. Clark, room 1331, 72 W. Adams St., Chicago.

Indiana Gas Ass'n—April, 1918; Indianapolis. Pres., E. J. Burke; Sec., James W. Dunbar, New Albany.

Iowa District Gas Ass'n—Meeting postponed; place, Des Moines. Sec.-Treas., H. R. Sterrett.

Michigan Gas Ass'n—Meeting postponed; place, Grand Rapids. Pres., Glenn R. Chamberlain, Grand Rapids; Sec.-Treas., Clark R. Graves, Lansing.

National Commercial Gas Ass'n—Indefinitely postponed; place, Detroit. Pres., James T. Lynn, Detroit; Sec. and Asst. Treas., Louis Stotz, 61 Broadway, New York.

Natural Gas Ass'n of America—May 21, 22 and 23, 1918; Louisville, Ky. Pres., J. F. Guffey, Pittsburgh; Sec.-Treas., T. C. Jones, Delaware, O.; Resident Sec., D. O. Holbrook, Henry W. Oliver Bldg., Pittsburgh.

New England Ass'n of Gas Engineers—February, 1918; Copley Plaza Hotel, Boston. Pres., J. F. Wing, Everett, Mass.; Sec.-Treas., N. W. Gifford, 26 Central Square, East Boston.

New Jersey State Gas Ass'n—April, 1918. Pres., O. F. Potter, Newark; Sec.-Treas., Jacob Jones, Bridgeton, N. J.

Pacific Coast Gas Ass'n—September, 1918; Los Angeles. Pres., John D. Kuster, San Jose; Sec.-Treas., Henry Bostwick, 445 Sutter St., San Francisco.

Pennsylvania Gas Ass'n—April, 1918; Philadelphia. Pres., W. O. Lamson, Jr., West Chester, Pa.; Sec., L. R. Dutton, Jenkintown, Pa.

Society of Gas Lighting—December, 1917; New York; monthly meetings, second Thursday. Pres., Fred S. Benson; Sec., George G. Ramsdell, 29 W. 39th St., New York.

Southern Gas Ass'n—May 1, 2, 3, 1918; Chattanooga, Tenn. Pres., F. L. Marshall, Augusta, Ga.; Sec.-Treas., M. A. Bowlin, Macon, Ga.

Southwestern Electrical and Gas Ass'n—April, 1918; Galveston, Tex. Pres., H. C. Morris, Dallas, Tex.; Sec., H. S. Cooper, 405 Slaughter Bldg., Dallas.

Texas Gas Ass'n—September 10 and 11, 1918; Ft. Worth, Tex. Pres., F. J. Storm, Amarillo; Sec., C. H. Seidenglanz, 1501 Commerce St., Dallas.

Wisconsin Gas Ass'n—March, 1918; Hotel Pfister, Milwaukee. Pres., B. F. Lyons, Beloit; Sec., Henry Harman, Milwaukee.

Coal In Colorado Has Reached Exorbitant Figures.

Testimony by a large number of utilities has moved the Utilities Commission of Colorado to apply to the national fuel administration for a reduction of steam coal prices. Some companies have been paying as much as 200 per cent more for coal than formerly.

Coal Conservation

Costs of production have more attention today than ever before. The cost of coal for generation of power has in many instances not had the same consideration as other costs, because coal has been cheap and obtainable in abundance; cheap coal and cheap labor sometimes made it apparently economical in dollars and cents to install and run an inefficient plant. Coal has now become expensive. It is hard to obtain. Efficiency in its use and avoidance of waste have become of first importance, since without power other materials cannot be utilized. These conditions make it imperative for every owner or manager of a power plant to examine into the cost of the power his establishment uses, the economy with which it is generated and applied, and the increase in efficiency that is possible.

So declares the Committee on Coal Conservation of the Chamber of Commerce of the United States, by Ernest T. Trigg, chairman. Some of the suggestions made by the committee follow:

Find the nearest source of coal that will meet the requirements, even if it does take a little more trouble to use it; the tax on the transportation system will thus be reduced so far as haulage by rail is shortened; coal is mined in twenty-six states, and these states extend practically across the continent and from the northern to the southern borders.

Give to the power plant and its personnel the recognition and encouragement due to an expert and important department.

Seek to increase skill and proficiency in the men who handle the coal. A fireman at a hand-fired boiler shovels three to ten tons of coal a day—or as great a value in material as many skilled men in other departments handle.

Put the fuel-using equipment into as perfect condition as possible. Provide at hand-fired plants an ample firing floor with a good surface, together with a smooth-bottomed coal car, if it can be used. Eliminate leaks in the boiler setting, see that fire-doors fit properly, replace defective grate bars, make sure that smoke connections are clean and tight; if mechanical stokers are used, see that they are in good repair and that directions for using them are being followed.

Install simple and convenient means by which the fire-room force may see results—scales for weighing fuel and ash, meters for measuring water fed to the boiler, and devices for determining the quality of flue gases, the draft over the fire, etc. Convenient means for operating the flue damper must be installed.

Endeavor to run boilers in service at their capacity. If efficiency is increased, one or more boilers in a battery may be dropped.

Provide water that is free from scale by using, when necessary, water-treating devices for large and special feed-water heaters for small plants.

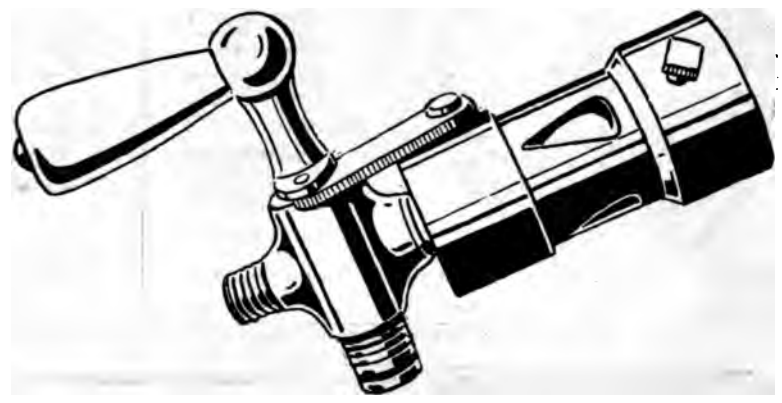
Reduce loss of heat after it is generated. See that boiler surfaces and steam pipes are properly covered. The simplest and most inexpensive covering will reduce loss by 80 per cent. In the engine room cut out useless steam lines, have valves properly set, reduce the small auxiliary pumps, etc., to a minimum, and provide the repairs for which the engineer has been asking.

Obtain expert advice. Good steam engineers are familiar with well-tried ways of reducing both consumption of coal and consumption of heat.

One pound of coal per hour has yielded a horsepower per hour. That is the record of present possibility. It cannot by any manner of means be attained in every plant. But the fact that at present the average attainment throughout the country is but one-third or one-fourth of this record is indicative of the possible savings that can be made if the care and attention which the power plant deserves are actually given to it.

Standardize the Hale Mixer

on your appliances—save gas and maintenance expenses



The Hale Gas Mixer has proved that it is the best device for perfecting gas combustion by simultaneously controlling the flow of gas and air. It equalizes differences in pressure and quality of gas. The evidence is on thousands of gas appliances today.

Now, when waste is treasonable and labor shortage in maintenance corps almost paralyzing, you should install Hale Mixers at every possible opportunity.

Write us, please, for plain and complete proof that you should specify Hale Gas Mixers on new appliances and campaign them, so that your old appliances would be made more efficient.

The Hale Mixer is doing wonders in the industrial field. Ask us for data.

International Hale Gas Mixer Company

Turk's Head Building Providence, R. I.

Pacific Coast Representatives: C. B. BABCOCK CO., San Francisco

Practical gas range accessories that increase the pulling power of your show room.

The PERFO Radiating Plate consists of a perforated two section metal plate that prevents food from scorching or burning. It makes constant stirring unnecessary. Makes of every kettle a double boiler.

The PERFO Hood Oven is a small hood that fits over the top of the PERFO Plate and permits quick and economical baking of a few potatoes, apples, custards, etc. Wire rack can be advantageously used with it.

The selling price of these gas range accessories is low.

Gas companies find them great show room attractions. Let your demonstrators try them.

Write for samples, prices and discounts.

Golden Gate Mfg. Co.
9 Desbrosses St. NEW YORK

Odorless Gas Iron

Nu Styl, Two-(Weights) In-One Iron

Bunsen Burner, Hale Gas Mixer Shock Absorber, Spring Handle

The women folks say: "I iron all day in small room without trace of gas smell." "I would not be without my Nu Styl, for ten dollars." "I have tried all the gas irons but did not know what a real iron was until I got my Nu Styl."

We will send sample iron for testing to interested new business men.

Shipping weight, one dozen Nu Styl Ironing Outfits, 115 lbs. See descriptive ad Gas Record of Nov. 28, 1917, page 44.

Perfect Combustion Co.
528 Peoples Gas Bldg., Chicago, Ill.

The House of Taylor

400 Baths
600 Rooms

HOTEL MARTINIQUE
BROADWAY, 32D STREET NEW YORK

One Block from Pennsylvania Station.

Equally Convenient for Amusements, Shopping or Business.

157 Pleasant Rooms, with Private Bath, $2.50 PER DAY.

257 Excellent Rooms, with Private Bath, facing street, southern exposure, $3.00 PER DAY.

Also Attractive Rooms from $1.50

The Restaurant Prices Are Most Moderate.

C. W. BARNES

SHIPPER-JOBBER

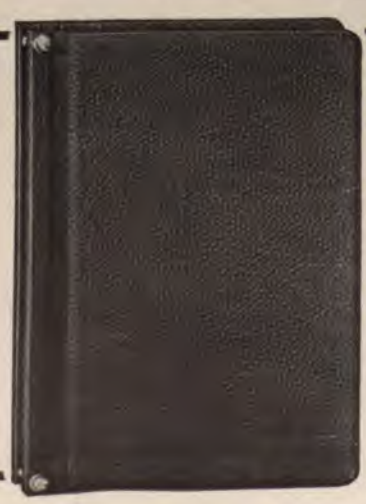
GAS PURIFYING MATERIALS

BALED SHAVINGS

DIRECT FROM THE MILL TO YOU

SAMPLES Upon Request

CHICAGO 3808 ELLIS AVE.



This handy GAS RECORD binder is yours for $1.50 or free with 2 new subscriptions at $2 a year each.

It holds 12 issues of THE GAS RECORD convenient for reference.

THE GAS RECORD
20 West Jackson Blvd. Chicago

NEW PRODUCTS

Heat Storing Range Featured by Michigan Stove Co.

The Michigan Stove Co., Detroit, announces its 143 series of heat storing ranges of which the chief feature is the oven which retains the heat and ventilates itself automatically. The manufacturer makes the following statement about the operation and specifications of this range:

"Start the oven in your usual way. When it is baking properly, turn a lever —that is all you have to do. The oven will then continue to bake as it should—but with a flame that is hardly noticeable. This small flame, however, serves to keep the oven ventilated. It makes it indeed, a wholesome oven, one that is dry and odorless at all times."

New Garland Heat-Storing Gas Range.

Dimensions.

Size of oven	18x18x11
Size of broiler	18x18x9
Height of cooking top	31 inches
Extreme height	58 inches
Extreme width	50 inches
Extreme depth	27 inches
Cooking top	25½x22
Floor space	46x22
Consumption of large oven burner	25-35 feet per hour
Consumption of small oven burner	5-6 feet per hour

The Asbestos Protected Metal Co., of Pittsburgh, announces that on and after Dec. 1, 1917, it will be represented in the the state of Georgia by J. F. Schofield's Sons Co., at Macon.

Young Brothers Offer Japanning Oven Data.

Young Brothers Co., Detroit, makers of japanning, drying and enameling ovens have compiled some valuable gas oven data that will be of timely interest to industrial gas men. A copy of the material will be gladly sent upon request. The Young Brothers organization is well equipped to give gas men specific information that will be of help in landing oven jobs and will welcome any requests for data in which details of the proposed installation are outlined.

Harbison Tours with Safety Gas Room Heater.

Charles "Ossco" Harbison, sales pusher for the Ohio State Stove Co., now is busily engaged in preaching "safety first" in reflector heaters. Armed with a diagram of the Ossco front burner construction and a pocketful of business cards, Harbison made his first tour of the gas field in his present capacity. Ossco front burner reflector heaters are bound to be very popular in the gas field on account of their perfectly safe construction, according to Harbison.

Lindsay Light Co., Chicago, makers of thorium for gas mantle manufacturers, was prominently mentioned in Chicago newspapers as contributing in a large way to the fund for relief of Halifax disaster sufferers.

Bethlehem Steel Co. Orders 72-In. Venturi Meter.

A duplicate repeat order for one of the world's largest gas meters is featured in bulletin 126 recently issued by the Builders Iron Foundry of Providence, R. I. In 1910 the Bethlehem Steel Co. purchased a 60-in. Venturi meter having a maximum capacity of 50,000 cu. ft. of free gas per minute. This is one of the largest if not the largest gas meter in the world, it is declared. On June 5, 1914, the Bethlehem company ordered another Venturi meter of the same size. It is interesting to note that the Builders Iron Foundry Co. now is working on a 72-in. Venturi meter for the same company.

Semet-Solvay Co. Building By-Product Ovens at Chattanooga.

The Chattanooga Coke & Gas Co. is a reorganization of the Chattanooga Gas & Coal Products Co., with the same principals in control. The Semet-Solvay Co. has a contract for building a block of 24 Semet-Solvay ovens in place of the ovens originally built. The new ovens are nearly completed, and will go into run in the course of a month or two, the Semet-Solvay Co. being in charge of the operation under contract with the owners. The plant will produce coke and the usual by-products for the general market, and the gas will be sold to the Chattanooga Gas Co. for domestic and industrial use.

New Catalog Featuring "Beaver" Tools.

The Borden Company, Warren, Ohio, has just issued its 1918 Catalog of "Beaver" Easy Working Die Stocks and Square-End Pipe Cutters. This catalog is said to be the finest tool catalog ever issued. It illustrates in a complete and artistic manner the complete line of "Beaver" Easy Working Die Stocks and Square-End Pipe Cutters.

Several new "Beaver" Tools are shown for the first time in this catalog—one of the most popular of these being the new No. 3 "Beaver" Junior Ratchet Die Stock, which is built on the unit plan to thread pipe from ⅛ to 1", inclusive.

While this expensive catalog is not intended for general distribution, The Borden Company will send a copy to any gas man who will write a letter or card stating that he is interested in "Beaver" Tools, at the same time mentioning the GAS RECORD.

Isbell-Porter Booklet On Woodall-Duckham Verticals.

The Isbell-Porter Co., Newark, N. J., has issued bulletin G describing the Woodhall-Duckham continuous vertical retorts. A short history of carbonization in vertical retorts and a description of the features of the Woodall-Duckham system in detail is given.

Welsbach Pilot Glow Produces Soft Moonlight Effect.

One of the Public Service Gas Co.'s representatives, Mr. Adams, of Passaic, N. J., has a lighting installation in the plant of the Merrick Scale Co. The works are equipped with the new Welsbach CC Pilot, and, according to "Service," the utility company's publication, the glow from these pilots furnishes a uniform light through the factory at night, which closely resembles moonlight. The factory manager says this saves the expense of extra night lights and is particularly convenient in emergencies requiring a hurried trip through the factory after dark.

Truck Trailer Being Made Especially for Pipe.

Warner Mfg. Co., Beloit, Wis., now is making a truck trailer especially for pipe. This trailer is made with gas

Truck Trailer for Pipe.

company conditions in view and is expected to find a big market awaiting. The trailer is made so that differences in the road bed betweeen the trailer and turns in the road will be cared for. The Warner truck trailer is illustrated herewith.

New Incinerite Sales Manager at New York.

E. C. Stearns & Co., Syracuse, makers of the Incinerite, have placed O. L. Rankin in charge of their New York Incinerite sales office at 3750 Grand Central Terminal building. Mr. Rankin has been very successful in promoting the sales of Incinerites while connected with the Ross Sales Agency of Columbus, Ohio, of which he was secretary-treasurer. The Stearns organization feels that the addition of Mr. Rankin to their staff is a happy arrangement for all concerned as Mr. Rankin is well qualified to give thorough Incinerite co-operation to gas companies. Gas men are invited to call upon Mr. Rankin at any time whether they are from New York or other territory in Mr. Rankin's domain.

B. F. Sturtevant Co. Plans Large Addition at Reading, Mass.

The B. F. Sturtevant Co., Hyde Park, Mass., manufacturer of blowers, has had plans prepared for a large addition to its Reading (Mass.) plant.

The Gas and Electric Sales Co. has been incorporated at San Francisco, Cal., with a capital stock of $40,000. Subscribers and directors are Thomas Steel, Berkeley, Cal.; M. J. Purcell, V. A. Kuehn, Lee M. Olds, A. C. Duerr, of San Francisco, one share each.

PROTECTING GOOD WILL.

British Manufacturers Keep Advertising To Retain Effect of Years of Earnest Effort.

English manufacturing institutions have trimmed their ballast so that the blows of war time are minimized. Current advertising in English publications, instead of soliciting orders, invite the entry of the purchaser's name upon the manufacturers waiting list. Automobile advertising in England, as in America, is a good barometer of business conditions. One English automobile advertiser calls attention to the distinguished character of his waiting list, another lays stress upon the war field service of his machine.

The gas field will be particularly interested in the accompanying advertisement of Samuel Cutler & Sons, clipped from the London Gas Journal. The firm announces: "War work at the present time engages all our energies, but on the restoration of peace, our increased facilities resulting from improved equipment and extension of works will be available for the renewed carrying out of contracts embracing the whole sphere of gas engineering."

The English manufacturers have come to the conclusion that it pays them to keep advertising with the object of protecting the good will gained by years of earnest striving.

Beaumont Co. Moves Its New York Office.

The New York office of R. H. Beaumont Co. recently moved to new and larger quarters at 50 Church Street.

Regulator for Checking the Pressure in a Pipe Line.

For stopping the flow of gas in a pipe line when the pressure drops to a certain point, the Chaplin-Fulton Mfg. Co., of Pittsburgh, is manufacturing a back or check pressure regulator which can be set to operate at any predetermined point. While the company has been making this regulator for many years its sale during

Fulton Back Pressure Regulator.

the past year has been exceptionally active because of its application in gasoline recovery plants. The regulator has various applications both in the artificial and natural gas industries and will prove a valuable asset for many installations.

Typical Advertising by Construction Companies in England.

Oklahoma Gas Conservation

The Oklahoma Corporation Commission, having held a hearing and investigation on the Oil and Natural Gas Conservation Laws of the state, has prescribed the following rules:

Rule 1. Waste Prohibited.—Natural gas and crude oil or petroleum shall not be produced in the state of Oklahoma in such manner and under such conditions as to constitute waste.

Rule 2. Waste Defined.—The term "waste" as above used, in addition to its ordinary meaning, shall include (a) escape of natural gas in commercial quantities into the open air, (b) the intentional drowning with water of a gas stratum capable of producing gas in commercial quantities, (c) underground waste, (d) the permitting of any natural gas well to wastefully burn, and (e) the wasteful utilization of such gas.

Rule 3. Gas to be Confined—Strata to be Protected.—Whenever natural gas in commercial quantities or a gas-bearing stratum known to contain natural gas in such quantities is encountered in any well drilled for oil or gas in this state, such gas shall be confined to its original stratum until such time as the same can be produced and utilized without waste, and all such strata shall be adequately protected from infiltrating waters.

Rule 4. Commercial Quantities Defined.—Any gas stratum showing a well-defined gas sand and producing gas shall be considered capable of producing gas in commercial quantities, and any gas coming from such a stratum or sand shall be considered a commercial quantity, and such stratum or sand shall be protected the same as if it produced gas in excess of 2,000,000 cubic feet per day of twenty-four hours.

Rule 5. Gas to be Taken Ratably.—Whenever the full production from any common source of supply of natural gas in this state is in excess of the market demands, then any person, firm, or corporation having the right to drill into and produce gas from any such common source of supply may take therefrom only such proportion of the natural gas that may be marketed without waste, as the natural flow of the well or wells owned or controlled by any such person, firm or corporation bears to the total natural flow of such common source of supply, having due regard to the acreage drained by each well, so as to prevent any such person, firm, or corporation securing any unfair proportion of the gas therefrom; provided, that the corporation commission may by proper order permit the taking of a greater amount whenever it shall deem such taking reasonable or equitable.

Rule 6. Common Purchaser Rule.—Every person, firm or corporation, now or hereafter engaged in the business of purchasing and selling natural gas in this state, shall be a common purchaser thereof, and shall purchase all of the natural gas which may be offered for sale, and which may reasonably be reached by its trunk lines, or gathering lines, without discrimination in favor of one producer as against another, or in favor of any one source of supply as against another save as authorized by the corporation commission after due notice and hearing, but if any such person, firm, or corporation shall be unable to purchase all the gas so offered, then it shall purchase natural gas from each producer ratably.

Rule 7. Common—Purchaser—Discrimination Prevented.—No common purchaser shall discriminate between like grades and pressures of natural gas, or in favor of its own production or of production in which it may be directly or indirectly interested, either in whole or in part, but for the purpose of prorating the natural gas to be marketed, such production shall be treated in like manner as that of any other producer or person, and shall be taken only in the ratable proportion such production bears to the total production available for marketing.

Rule 8. Gas to be Metered.—All gas produced from the deposits of this state when sold shall be measured by meter, and the corporation commission shall, upon notice and hearing, relieve any common purchaser from purchasing gas of any inferior quality or grade, and the commission shall from time to time make such regulations for delivery, metering, and equitable purchasing and taking as conditions may necessitate.

Rule 9. Commission Shall Regulate the Taking of Natural Gas.—The corporation commission shall as occasion arises prescribe rules and regulations for the determination of the natural flow of any well or wells in this state, and shall regulate the taking of natural gas from any and all common sources of supply within the state so as to prevent waste, protect the interests of the public and of all those having a right to produce therefrom, and shall prevent unreasonable discrimination in favor of any one common source of supply as against another.

Rule 10. Eminent Domain—Acceptance of Law to be Filed with Commission.—Before any person, firm, or corporation shall have, possess, enjoy, or exercise the right of eminent domain, right of way, right to locate, maintain, construct, or operate pipe lines, fixtures, or equipment belonging thereto or used in connection therewith, for the carrying or transportation of natural gas, whether for hire or otherwise, or shall have the right to engage in the business of purchasing, piping, or transporting natural gas, as a public service corporation, or otherwise, such person, firm, or corporation shall file in the office of the corporation commission a proper and explicit authorized acceptance of the provisions of the law.

Rule 11. Duties of Conservation Officers in Reference to Rule 10.—All conservation agents of the corporation commission are directed to inquire into the matter of the performance of and compliance with the foregoing rule (No. 10), and to prevent the transportation of gas by any person, firm, or corporation, found not to have complied with said rule.

Rule 12. Approved Methods of Preventing Waste to be Used.—All operators, contractors, or drillers, pipe line companies, gas distributing companies or individuals, drilling for or producing crude oil or natural gas, or piping oil or gas for any purpose, shall use every possible precaution in accordance with the most approved methods, to stop and prevent waste of oil and gas, or both, in drilling and producing operations, storage, or in piping or distributing, and shall not wastefully utilize oil or gas, or allow same to leak or escape from natural reservoirs, wells, tanks, containers, or pipes.

Rule 13. Notice of Intention to Drill, Deepen, or Plug.—Notice shall be given to the corporation commission of the intention to drill, deepen, or plug any well or wells, and of the exact location of each and every such well. In case of drilling, notice should be given at least five days prior to the commencement of drilling operations. Notification of intention to plug must be accompanied by a complete log of the well, on forms prescribed by the corporation commission.

Rule 14. Plugging Dry and Abandoned Wells.

(a) Must Be Plugged under Supervision of Conservation Agent. All dry or abandoned wells shall immediately be plugged under the supervision of an oil and gas conservation agent of the corporation commission.

(b) Manner of Plugging.—All dry

without waste. (Sess. Laws 1915, § 3, chap. 197; and in confining gas to its original place, the mud-laden fluid process shall be used unless the character of the formation involved is sufficiently ascertained and understood to know that the casing and packer method with Braden-head attachment can be safely applied and competently used, and in the use of the casing, packing, and Braden-head method, separate strings of casing shall be run to each sand, and application of the latter method in preference to the former shall not be made without notice to and consent of the corporation commission.

Rule 29. Vacuum Pumps Not to be Installed Except upon Application to this Commission.—The future installation of vacuum pumps or other devices for the purpose of putting a vacuum on any gas or oil bearing stratum is prohibited, provided that any operator desiring to install such apparatus may, upon notice to adjacent lease owners or operators, apply to the commission for permission; and in the matter of vacuum pumps heretofore installed, the use of same is authorized unless specifically discontinued by order of the commission upon notice and hearing.

Rule 30. Shooting of Wells.

(a) Wells Not to be Shot into Salt Water.—No wells shall be so shot as to let in salt water or other foreign substance injurious to the oil or gas sand.

(b) Reports to be Made to the Corporation Commission.—Reports shall be made to the corporation commission on all wells shot, showing the condition of the well before and after shooting, including the size of the shot, sand or sands shot, production before and after shooting, per cent. of water in well before and after shooting.

(c) Damaged Wells to be Abandoned.—In case irreparable injury is done to the well, or to the oil or gas sand or sands by shooting, the well shall immediately be abandoned and plugged as provided by rule No. 14 herein.

Rule 31. Gauge to be Taken—Reports to Commission.—All oil and gas operators shall between the 1st and 10th of each calendar month take a gauge of the volume and rock pressure of all wells producing natural gas, and shall forthwith report to the corporation commission on gauge blanks furnished by the commission.

Rule 32. Production to be Restrained to 25 per cent. of Potential Capacity.—When the gas from any well is being used, the flow of production thereof shall be restrained to 25 per cent. of the potential capacity of the same; that is to say, in any day (twenty-four hours) the well shall not be permitted to flow or produce more than one-fourth of the potential capacity thereof, as shown by the last monthly gauge.

Rule 33. Notification of Fires and Breaks or Leaks in Lines.—All drillers, operators, pipe line companies, and individuals operating oil and gas wells or pipe lines shall immediately notify the commission by telegraph or telephone and by letter of all fires which occur at oil and gas wells or oil tanks owned, operated, or controlled by them or on their property, and shall immediately report all tanks struck by lightning and any other fires which destroy crude oil or natural gas, and shall immediately report in the manner heretofore described any breaks or leaks in tanks or pipe lines from which oil or gas is escaping. In all reports of fires, breaks, or leaks in pipes, or other accidents of this nature, the location of the well, tank, or line break shall be given, showing location by quarter, section, township, and range.

Rule 34. Reports from Pipe Line Companies. — The commission will from time to time require oil and gas pipe line companies to make reports to the corporation commission showing wells connected with their lines during any month, the amount of production taken therefrom, names of parties from whom oil and gas are purchased, the amount of oil or gas purchased therefrom; and all oil and gas pipe line companies shall, in addition to the other reports required by the rules of the corporation commission, furnish to this commission duplicates of all reports made to the state auditor under the oil and gas gross production tax laws. The commission will, in case of over-production or for any other reason which it deems urgent, require oil and gas pipe line companies to furnish daily reports of the amount of oil or gas purchased or taken from different wells or parties.

Rule 35. Prescribing Conditions under Which Pipe Line Companies May Connect with Oil or Gas Wells.—Pipe line companies shall not connect with oil or gas wells until the owners or operators thereof shall furnish a certificate from the corporation commission that the conservation laws of the state have been complied with; provided, this rule shall not prevent the temporary connection with any well or wells in order to take care of production and prevent waste until opportunity shall have been given the owner or operator of said well to secure certificate showing compliance with the conservation laws of the state.

Rule 36. Conservation Laws and Rules of the Corporation Commission to be Complied with Before Connecting Wells with Pipe Lines.—Owners or operators of oil or gas wells shall, before connecting with any oil or gas pipe line, secure from the corporation commission a certificate showing compliance with the oil and gas conservation laws of the state and the conservation orders of the corporation commission; provided, that this rule shall not prevent temporary connection with pipe lines in order to take care of production until opportunity shall have been given for securing such certificate; provided, further, that the owners or operators of such wells shall, in a known or proved field, make application for such certificate in anticipation of production.

Rule 37. Drilling Records to be Kept at Wells.—All operators, contractors, or drillers shall keep at each well accurate records of the drilling, redrilling, or deepening of all wells, showing all formations drilled through, casing used, and other information in connection with drilling and operation of the property, and any and all of this information shall be furnished to the commission upon request, or to any conservation agent of the commission.

Rule 38. Conservation Agents to Have Access to All Wells and all Well Records.—Conservation agents of the commission shall have access to all wells and to all well records, and all companies, contractors, or drillers shall permit any conservation agent of the corporation commission to come upon any lease or property operated or controlled by them, and to inspect any and all wells and the records of said well or wells, and to have access at all times to any and all wells, and any and all records of said wells. Provided that information so obtained by conservation agents shall be considered official information and shall be reported only to the corporation commission.

Rule 39. Notice to Contractors, Drillers, and Others to Observe Rules. —All contractors and drillers carrying on business or doing work in the oil or gas fields of the state, as well as lease holders, landowners, and operators generally, shall take notice of and are hereby directed to observe and apply the foregoing rules and regulations; and all contractors, drillers, landowners, and operators will be held responsible for infraction of said rules and regulations.

Rule 40. Conservation Agents to Co-operate with Oil and Gas Inspectors of the Department of the Interior.—All conservation agents appointed by the corporation commission shall co-operate with and invite the co-operation of the oil and gas inspectors of

the United States Bureau of Mines of the Department of the Interior.

Rule 41. Conservation Agents to Assist in Enforcement of Rules.—All conservation agents of the commission shall assist in the enforcement of these rules, and shall immediately notify the commission upon observance of any infraction thereof.

The commission, in addition to these general findings, makes the following specific findings of fact and conclusions:

The plugging of dry and abandoned wells, heretofore done by the use of sand, cement, and wooden plugs, is wholly inefficient and has been productive of waste; the plugging of dry and abandoned wells has not and will not safely be done except under the supervision of a competent conservation agent of the state; dry and abandoned wells cannot be plugged satisfactorily except with the use of the mud-laden fluid of proper density. Operators have wasted natural gas and injured gas sands and have caused casing to freeze by flooding the wells with water while drilling, and this condition could be prevented by the use of mud-laden fluid of proper solution. Proper supervision of wells cannot be had without filing with the commission some few days in advance notice of intention to drill, deepen, or plug any well or wells. Reports from pipe line companies, showing wells connected with line, production taken, etc., are necessary for the prosecution of the work of conservation. Shooting of wells has heretofore been injurious in some instances by reason of wells being shot into salt water, thus allowing salt water to penetrate the sand.

FEEDING THEM.

Staggering Figures on Food Need in Training. Camps.

Feeding the men in military training at the army cantonments in this country is a matter so stupendous as to be almost beyond ordinary contemplation. Uncle Sam has made up his mind that the stalwarts who engage in his business of actually fighting the evils that threaten the liberty and freedom of the entire world shall have all that makes for strength and nourishment, and he wants those of his children who remain at home to appreciate the great responsibility he bears. There is not a loyal American in the entire fold who would have the soldiers cared for otherwise than in the best manner possible, and there is not a member of the vast legion of loyalists who is not willing to assist Uncle Sam to the best of his or her ability, making any sacrifices necessary. The money spent in giving the fighting forces plenty of good food *could not be invested* more soundly and securely, for the condition of the fighters will go far toward determining the great issue of the war between democracy and military autocracy.

The purchaser of a Liberty bond knows that his money is helping to keep the army fit, but he does not appreciate the great task Uncle Sam has in feeding his fighting hosts. At the largest of the cantonments there are 40,000 men in training, to say nothing of about 10,000 animals employed in the war service. The food supplied to 40,000 men for thirty days makes a menu like this:

Bacon	180,000 lbs.
Flour	1,404,320 lbs.
Hard bread	60,000 lbs.
Baking powder	6,505 cans.
Beans	128,000 lbs.
Rice	44,000 lbs
Tomatoes	77,880 cans
Prunes	30,000 lbs.
Evaporated apples	14,000 lbs.
Evaporated peaches	10,000 lbs.
Blackberry jam	30.720 cans.
Coffee	80,400 lbs.
Tea	12,000 lbs.
Granulated sugar	252,000 lbs.
Evaporated milk	53,760 pints
Vinegar	3,600 gals.
Cucumber pickles	3,000 gals.
Salt	52,000 lbs.
Black Pepper	13,000 cans.
Cinnamon	1,920 cans.
Cloves	720 cans.
Ginger	1,440 cans.
Nutmegs	120 lbs.
Syrup	12,720 gals.
Lemon extract	3,840 bots.
Vanilla extract	4,800 bots.
Soap	50,400 lbs.
Candles	24,000 lbs.
Safety matches	403,200 boxes.
Rock salt	2,000 lbs.
Fresh beef	1,200,000 lbs.
Fresh mutton	75,000 lbs.
Fresh Potatoes	1,200,000 lbs.
Fresh onions	224,000 lbs.
Lard	12,000 lbs.
Butter	40,000 lbs.
Ice	6,000,000 lbs.

Feeding 1,000,000 men means multiplying each of the above items by 25. A little arithmetic will show that 1,000,000 men daily will eat 5,971 barrels of flour of the wheat of a field nearly four miles long and almost as wide. They will consume 150,000 pounds of bacon, or the equivalent, if every hog were nothing but bacon, of 750 head weighing 200 pounds each. Ten carloads of potatoes, ten carloads of beef and a large part of a carload of coffee are necessary in the daily diet. And on top of all this, bear in mind that there are approximately 250,000 horses and mules at the thirty-two cantonments. Each horse is allowed fourteen pounds of hay, but seems to be satisfied with only nine pounds of oats.

A Drive for Junior Members of the American Gas Institute.

The American Gas Institute is making a drive for junior members—the young men who are coming up in the technical branches of the gas business each year. Those interested should address Geo. G. Ramsdell, secretary, 29 West 39th St., New York City.

DOHERTY GAS PROPERTIES.

Engineer F. C. Weber, Back From Inspection Tour, Tells of New Developments.

The West appears to be in excellent condition, according to the reports of F. C. Weber, artificial gas engineer of the Doherty Organization, who recently returned from a trip to the syndicate's various gas properties. Extracts from Mr. Weber's report follow:

Fremont (Neb.) Gas, Electric Light & Power Co.—The gas sendout has been greatly increased and it will be further added to by the construction of a new water gas generator. Fremont is very prosperous.

Lincoln (Neb.) Gas & Electric Light Co.—The chief development is the increased gas rate which is expected to go into effect before long. The increase amounts to 25 cents a thousand. The price of fuel oil and coke is still unusually high in that city. A great amount of residential building points to the prosperity. The local Chamber of Commerce is unusually active and influential.

Denver Gas & Electric Light Co.—In September the daily output was more than 5,000,000 cu. ft. and the present output represents an increase of from eighteen to twenty-five per cent. above last year's figures. This showing is remarkable in view of the limited equipment of the plant. A water gas machine is being installed to take care of part of the peak load.

Pueblo (Col.) Gas & Fuel Co.—In crease of 10 per cent. in the gross of the company. Some members of the Public Service Commission visited Pueblo while Mr. Weber was there, and seemed convinced of the justice of the higher rate asked for by the Pueblo company.

Salina (Kan.) Light, Power & Gas Co.—One of the most active of the smaller Doherty cities. Remarkble for its progressiveness. Unusual illumination of the main street and great use of light in the windows and stores.

City Light & Traction Co., Sedalia, Mo.—This plant is pretty well overloaded, particularly in regard to its electric business. A new bench will be put in to help handle the increased gas business as the bench which has just been completed is not sufficient.

Niagara Light, Heat & Power Co., Tonawanda, N. Y.—Mr. Weber attended a conference between representatives of the Tonawanda company and the Public Service Commission in regard to furnishing oven gas of a low calorific value for furnace use. Consent to use this gas was obtained, and the Tonawanda property will now have an available daily supply of 1,000,000 cu. ft. There seems a good opportunity to develop industrial fuel business in Tonawanda and the company is getting to work along these lines.

Fires From Electricity Twelve Times More Damaging Than Gas Fires.

A table compiled by the "Weekly Underwriter" shows that the damage done by fires of electrical origin in 1915 aggregated $11,142,559, whereas fires originated by gas caused a total damage of but $937,714.

ABOUT MEN YOU KNOW

HAMILTON'S CHANGE.

National Tube Advertising Manager Goes with Walworth Co., of Boston.

L. F. Hamilton, for the past nine years advertising manager for the National Tube Co. at Pittsburgh, has become associated with the Walworth Mfg. Co., of Boston Mass., in a similar capacity. His retirement from the National Tube publicity bureau to go with the Walworth company is in the nature of a return "home again" for Mr. Hamilton, for in his new office he will again have charge of the exploitation of the "Kewanee" union, the manufacturing interests of which were recently bought by the Walworth company. He will be succeeded in the National Tube Co., by W. L. Schaeffer, for several years his assistant.

Mr. Hamilton is one of the best known advertising men in the country, his influence having extended outside the actual sphere of his duties into the broader field of the publishers. He has been one of the strongest factors in the general uplift of advertising mediums and methods and is a recognized expert on publicity of the high principled and profitable kind. He is a valued contributor to advertising periodicals and a speaker on publicity subjects. He graduated from the University of Illinois in 1897, and joined the Western Tube Co., where he remained until 1908, having worked up to the responsible position of sales manager. From 1908 to his recent change he has been identified with the advertising success of the Kewanee union, Shelby tubing and National pipe. He is a member of the Technical Publicity Association of New York, member and first president of the Manufacturers' Publicity Association of Pittsburgh and of the Association of National Advertising Managers.

Several technical advertising men are graduates from the National Tube Company Advertising Department, having obtained their training under Mr. Hamilton, including W. A. Phillis, advertising manager, The Bordon Co., Wm. J. S. Ritscher, advertising manager, Petroleum Iron Works; G. E. Land, advertising manager, Blaw-Knox Company.

The Harrisburg (Pa.) Gas Co. has appointed W. S. Baldwin superintendent and Geo. L. Cullen new-business manager. Mr. Cullen formerly was associated with the U. G. I. Co. at Philadelphia.

Lieut. T. D. Alfred, of the motor division, quartermaster's department, has departed from Chillicothe, O., for France. He is the son-in-law of Charles Harbison, of the Ohio State Stove Co.

D. O. Holbrook.

E. W. Wagner, formerly with the East Ohio Gas Co., at Cleveland, now is with the United States troops in France.

H. H. Osborne, the well known gas appliance salesman, now is representing Albert Pick & Co., of Chicago, in Washington and Oregon. He expects to return East about December 15 to spend the holidays with his family at Ludington, Mich.

W. B. Miser, manager of the Drumright division of the Oklahoma Gas & Electric Co., has been elected president of the Drumright Rotary Club.

A. E. Lockwood, formerly general manager of the Bluefield (W. Va.) Gas & Power Co., has been commissioned a first lieutenant in the United States Army Signal Corps.

TAKES HOLBROOK.

Government Names Natural Gas Expert To Keep Munitions Plants in Gas.

David O. Holbrook, vice president and resident secretary of the Natural Gas Association of America, has been appointed to act in connection with the Priority Committee and the War Industries Board in the distribution of natural gas for industrial purposes.

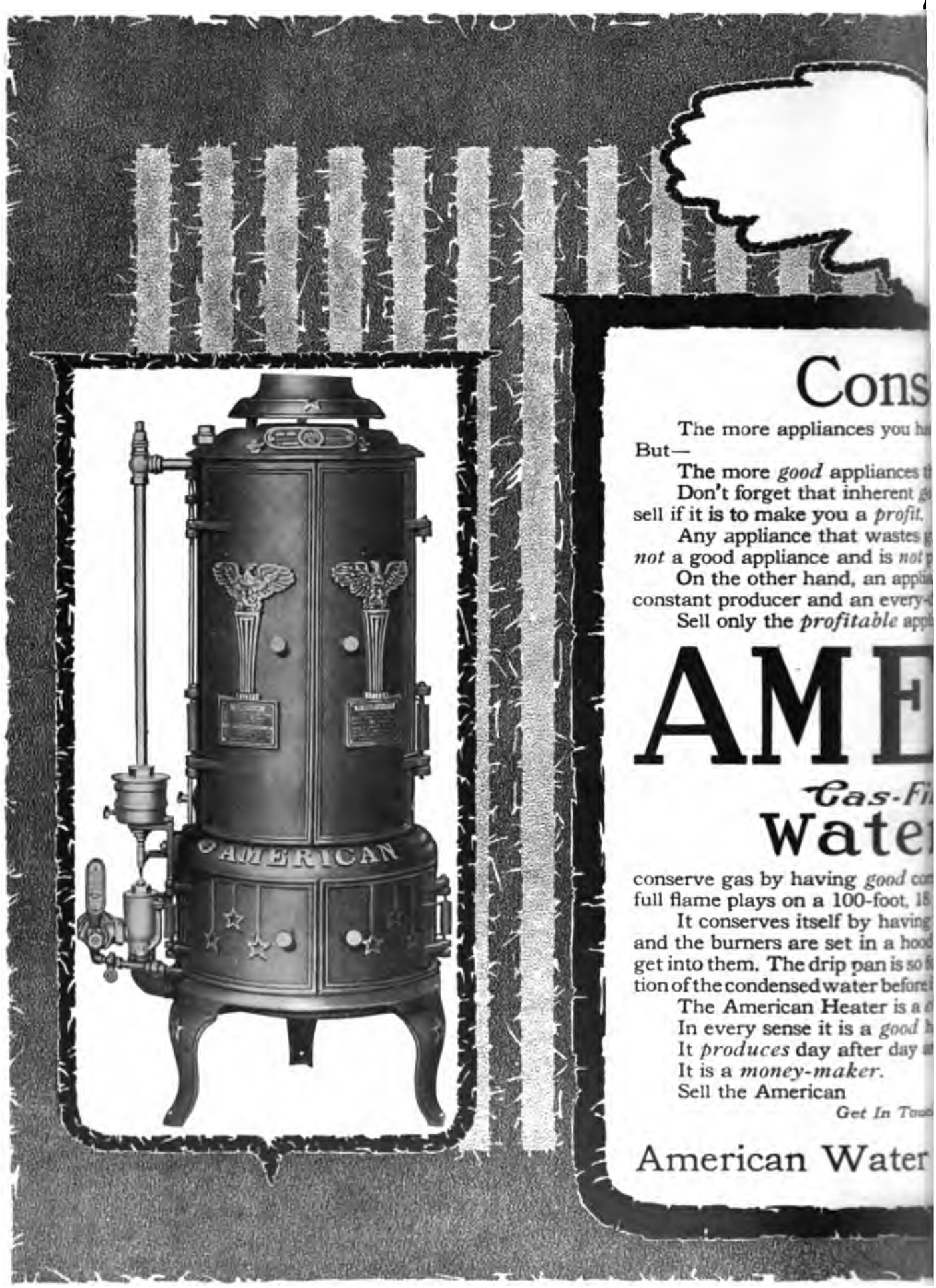
He will spend three days a week in Washington. His work will consist in procuring for the munition factories a preferential service by gas companies over other industries.

The selection of Mr. Holbrook places the natural gas administration in the hands of a man who is peculiarly well qualified to handle the situation. He came to Pittsburgh in 1893 from the University of Iowa and took a position in a Uniontown coke plant. He soon was transferred to the superintendent's office of the Hainsworth steel plant of the Oliver and Snyder Co. He rose to the position of purchasing agent with this company and, when its plants and furnaces were sold to the United States Steel Corp., in 1899, he went with the Pennsylvania Malleable Co., and the Central Car Wheel Co. as secretary. In 1906 he left this company to organize the Dayton Pipe Coupling Co. and the Dayton Pneumatic Tool Co. Since that time he has been manufacturer and contractor of supplies for natural gas pipe lines, and has a thorough knowledge of the capacity of practically all of the gas companies of the country.

Eugene B. Goodwin, Millville, N. J., president of the Millville Gas Co., Millville, died November 16, at his home, aged 71.

Robert Douglass Miller, assistant treasurer of the Public Service Co., of New Jersey, died at his home in Elizabeth, N. J., October 23, aged 70. For 40 years he had served in the organization and the companies that were its predecessors.

E. L. Clyne, superintendent of construction of the Denver Gas & Electric Light Co., died recently in his 55th year.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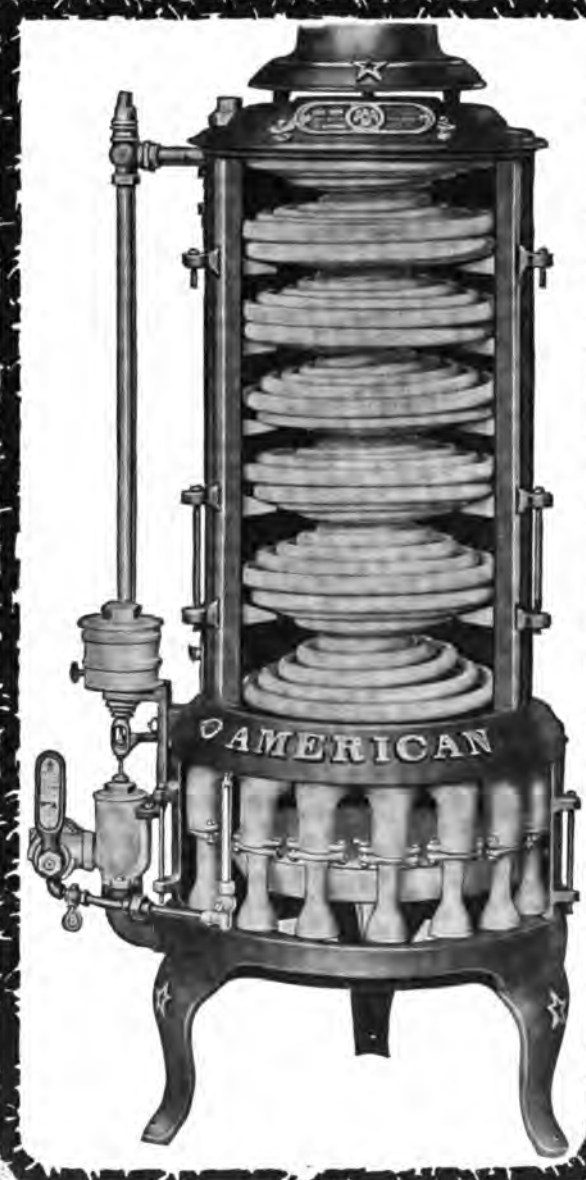


Umpire Rigler Is Regulator Man for East Ohio Gas Co.

"Cy" Rigler, National League baseball umpire who had the honor of officiating in the last World Series, is filling in his spare time this winter by acting as regulator man in the pressure department of the East Ohio Gas Co. at Cleveland. "I find the work just what I need to keep me in good condition," says Cy, in the East Ohio News, "and expect to hustle them up next season, right from the start."

O. M. Hartshorn, recently appointed secretary of the City Light & Water Co., at Amarillo, Texas, formerly held a similar position with the Pueblo (Colo.) Gas & Fuel Co., where he has been succeeded by E. R. Waite, of the Denver Gas & Electric Co.

C. B. Borden, of Marlboro, has been appointed superintendent of the Westboro (Mass.) Gas & Electric Co., succeeding Howard Hemenway.

E. L. Brandon is the new manager of the Central California Gas Co., at Visalia, Cal., succeeding W. A. White.

Albert B. Racht, formerly of the engineering department of the S. F. Bowser Co., has returned to the Western Gas Construction Co., where he served as engineer for more than five years.

E. G. Jones, who has been superintendent of the Warsaw (Ind.) Gas Co., for the past 18 months has been appointed superintendent of Goshen Gas Co., also, and in the future will handle both properties.

The consolidated Gas, Electric Light & Power Co., of Baltimore, has a large service flag hung over the Lexington St. entrance to the main building, in the center of which, in large figures of blue, is the number 185, the number of men from the company who are serving Uncle Sam.

Lewis B. Rhodes, Jr., formerly Asst. Supt., Hemico Co. Gas Co., Richmond, Va., is now a member of the Signal Corps, stationed at Camp Taylor, Ky.

Albert H. Vegkley, formerly manager of the commercial department of the Boston (Mass.) Consolidated Gas Co., who is moving to New York, recently was given a banquet by 100 Jamaica Plain men in the Westmister Hotel. Mayor Curley presented him with a traveling bag on behalf of his frie- ciates.

Harold R. Sterritt New Secretary of Iowa District Gas Ass'n.

Harold R. Sterritt, recently appointed secretary of the Iowa District Gas Association, is engineer of distribution for the Des Moines Gas Co. He was born in Philadelphia, April 14th, 1889, and received his education in the Central Manual Training School and the University of Pennsylvania, graduating from the university with a degree in mechanical engineering. From college he entered the service of the U. G. I. as cadet engineer, in 1911. Then he became inspector of appliances in 1914, entered the experimental plant in 1915, was engineering assistant for the Counties Gas & Electric Co., at Ardmore, Pa., that same year and in 1917 was made engineer of distribution at Des Moines. He became a member of the Illuminating Engineering Society while in Philadelphia and is now a member of the National Commercial Gas Association.

W. J. Pead, Jr. has been made superintendent of the Lowell (Mass.) Gas Light Co.

C. H. Hodges, in charge of the Twenty-first Street works of the Consolidated Gas Co., of New York, has resigned to become general superintendent of the Lehigh Navigation Electric Co., at Lewisburg, Pa. This is one of the companies of the Electric Bond & Share Co., of 71 Broadway, New York. Mr. Hodges learned the gas business under W. H. Gartley, of the U. G. I. Co., at Philadelphia.

G. W. Dresser has resigned as manager of the Goshen (Ind.) Gas Co. Mr. Dresser was, prior to his Goshen engagement three years ago, manager of the Warsaw (Ind.) Gas Light Co. for eight years.

R. L. Moore, who represents the Mueller Manufacturing Co., in Chicago, is active these days hailing his friends and announcing the birth of an heir to the Moore millions.

Richard J. Ambler, youngest son of T. M. Ambler, commercial manager of the Brooklyn Union Gas Co., has received his commission as second lieutenant at Plattsburgh training camp and will report at Camp Mead on December 15 for duty.

Prof. Alfred H. White, in charge of the gas engineering course at the University of Michigan, now is a captain in the U. S. Ordnance Department at Washington. Fred H. Wagner, of Baltimore, author of important gas books, is a major in the Officers' Reserve Corps of the Ordnance Department.

THE GAS MAN'S MARKETS.

Difficulty in Getting Coal Handicaps By-Product Recovery—Coke Production Increased.

Difficulty in securing coal and the congested condition of the railroads continue to hinder manufacturers of coal tar products, but no really serious situation yet has developed. Coal tar products at present are of much importance to the country's welfare and urgent efforts are being made to keep them from falling behind. Excepting toluol, of which the output at no time has been up to the government requirements of trinitrotoluol, the output equals requirements. Benzol sells at 45 to 46 cents per gallon for moderate requirements. Toluol no longer is as far behind government requirements as was the case a few months ago and is selling at $1.70 to $1.80. Phenol is practically sold up for the first quarter of 1918, the market remaining at 50 to 52 cents per pound.

Coke Production Increases.

Coke production for the week ended Nov. 29, was 316,017 tons, as compared with 306,240 tons for the preceding week. The government is requesting coke from by-product plants be sent to large gas plants so they can continue the manufacture of water gas. Demand for coal and coke in southern territory still exceeds production. Producers are maintaining the federal schedule of prices, although consumers are willing to pay more if they could get contracts accepted. The latter is impossible by reason of old contracts in hand, and manufacturers are going slow in making contracts. Many of the existing contracts on coke are near completion. New England by-product cokemakers now offer contracts at $15, delivered, and have booked considerable business at this price. The new figure is based upon $7, Connellsville ovens, adding $3.65 freight from Connellsville to New England. A committee of coke operators was organized in Pittsburgh, last week, to regulate shipments out of the Connellsville regions and to eliminate, so far as possible, cross-shipping through exchange of orders.

Cast Iron Pipe Prices Pending.

Cast-iron pipe makers have held several meetings recently concerning prices to be recommended for announcement by the American Iron and Steel institute. The market continues around $54.50, New York, for 6-inch, Class B, and $57.50 for 4-inch, Class B.

The Determination of Moisture in Coke.

A new publication, "The Determination of Moisture in Coke," known as technical paper 148, has been issued by the Bureau of Mines and is the result of work done by A. C. Fieldner and W. A. Selvig.

GAS LITERATURE AT A GLANCE

Conducted by R. S. McBride and C. E. Reinicker, Bureau of Standards, Washington, D. C.

Industrial Fuel From Gas-Works.

By E. W. Smith. Journal of the Society of Chemical Industry, 36, 758-61 (1917), via Chemical Abstracts. —The most important type of fuel produced on the gas works is the gas itself, while coke, tar, benzol suitable for motor spirit and creosote oil suitable for boiler firing rank next. The following facts are regarding English practice. Quenched coke is screened and sold in the following sizes: Large coke, 9 in. to 2 in. used for metal melting, boilers, and drop-forging; small coke, 1 ¼ in. to 2 in., used for domestic purposes, etc.; 1 in. breeze for chain-making, blacksmith work, etc.; bean breeze chiefly used for blacksmith work; pea breeze which finds the same use and is sometimes mixed with concrete, and dust which is used for boiler firing and for concrete slabs. The proportions of each size screened out depend on the nature of the coal carbonized, the particular type of carbonizing plant and the type of screening plant. The coke from continuous verticals is smaller, more porous and dryer than other coke, that from intermittent verticals is denser, harder and larger, while that from stamped charges is large, lustrous, dense and hard. Coke dust when sized has about the following composition: 20 per cent. over a 3-mesh screen, 22.7 per cent. over a 4-mesh screen, 14.6 per cent. over a 6-mesh screen, 7.7 per cent. over an 8-mesh screen, and 33.1 per cent. through the 8-mesh screen. About ten gallons of tar is obtained from each ton of coal. The composition varies with the type of carbonizing installation and the conditions of temperature to which the distillation products are subjected. The average quantity of creosote present in the tar may be taken as 30 per cent. When used under boilers one pound of creosote will evaporate 11.24 pounds of water. Creosote has been used for some time as a fuel-oil and there are special oil burners for this purpose which require low-pressure air at 0.5-3.0 lbs. per sq. in. for operation. The temperatures attainable are very high and the cost of heating compares favorably with many other fuels. The creosote oil makes an excellent fuel for boiler firing and for metal-melting furnaces.

Wood in Gas Making.

"Gas Journal," 138, 191 (1917).—Fir and oak were distilled in gas retorts in charges of 100 or 120 kg., respectively. In either case the yield of gas was about 900 cubic feet. Stoppages in the ascension pipes were prevented by alternating coal with the wood distillations. The cost of production after deducting for the sale of charcoal was, in the case of fir, 11.5 francs; oak, ten francs.

Coal Distillation Under Pressure.

By J. H. Capps and G. A. Hulett. Journal of Industrial and Engineering Chemistry, 9, 927-35 (1917), via Chemical Abstracts.—Extensive experiments to determine the effect of high pressure upon the character of the decomposition products of coal are described. Up to 20 atmospheres the amounts of high-boiling compounds decrease while the low-boiling compounds in the condensable vapors below 600 degrees increase along with the low-boiling aromatic substances. These results are attributable to cracking brought about by subjecting the vapors of heavy compounds to temperatures considerably above their boiling points. Pressure increases the amount of coke residue and also its percentage of fixed carbon and the calorific value, while percentages of nitrogen, oxygen, sulphur and volatile matter fall. Up to 600 degrees the volume of gas increases with rise in pressure.

New Measuring Device for Gasworks Laboratory.

By K. Norton. Gas World, 67, 126 (1917), via Chemical Abstracts.—The device described was made from an old pipette from which the discharge jet was broken and a T-piece welded on in its place. On the T are two valves—one at the side to let in the solution from a supply bottle overhead, and the other near the bottom to discharge the pipette. The pipette is supported by a stand and used like an automatic burette, having been calibrated for the desired quantity of liquid. A modification consisting of three different sized pipettes welded together one above another and calibrated to measure five different amounts, was also found very satisfactory.

Rapid Testing of Ammonia Still Effluents.

By K. Norton. Gas World, 67, 146 (1917), via Chemical Abstracts.—There is illustrated an apparatus designed for distilling of ammonia from still effluents; it consists of an iron can having three holes in the bottom fitted with rubber stoppers and inverted. The neck is also fitted with a one-hole stopper for discharging. Through one of the holes in the bottom the liquor is introduced, through another steam, and the third, fitted with a Kjeldahl bulb connected in turn with a vertical pipet which dips into an Erlenmeyer flask containing standard acid, serves to carry off the distillate. The ammonia is determined by titrating the excess acid and after the distillation, as in the Kjeldahl method. If it is desired to determine fixed ammonia a little 10 per cent. NaOH solution is added to the still. The apparatus is easily cleaned, always ready for use, and occupies practically no bench room.

Dehydration of Tar.

By G. H. Sharples. Gas World, 67, 159-60, via Chemical Abstracts.—The composition of tar varies owing to many causes, the principal ones being the quality of coal, type of retort, and temperature of carbonization. The same quality of coal carbonized in different types of retort at two different gas works in Scotland gave widely varying results as shown by tables. The vertical retorts gave much the higher yield of light oil. Rectified naphthas are recovered from crude naphthas and light oils in ordinary tar distillation, and from light oils given off in the process of dehydration. Considerable quantities of creosote are also carried over in the dehydration because real fractionation is at a minimum, and conversely, considerable quantities of naphtha are left in the dehydrated tar. The ordinary retort test does not show the presence of light oil, but careful fractionation shows that the oil distilled between 175 and 270 degrees from the dehydrated tar may contain 2 per cent. of light naphthas. The tar acids are found chiefly in carbolic or middle oil. A large portion is recovered in the crude taken off in dehydration, but about 50 per cent. is left in the dehydrated tar. The portion in the light oil is richer in phenol than is the creosote. Results gathered from the examination of mixed tars from the Johnstone Gas Works are given in tables. The most interesting figures are those for free carbon in crude tar (5.001 per cent.) and in the refined product. (6.01), which shows that it did not break down materially during its passage through the coil.

Using Low Grade Fuels with Existing Equipment.

By R. J. S. Pigott. "Electrical World," 70, 429-32 (1917).—The various problems arising in the use of high-ash coals are discussed at length.

Report of the Refractory Materials Committee (of the Institution of Gas Engineers.

"Gas World," 66, 452-4 (1917).—The committee reports on preparations made for experiments on: (a) the refractoriness of the materials under load; (b) temperature effect on size of the fire bricks; (c) clay used for jointing purposes; (d) relative effects of oxidizing and reducing atmosphere on the refractories; (e) effect of firing temperature on subsequent refractory quality of goods; (f) influence of flue dust on refractoriness and life of materials employed; (g) thermal conductivity; (h) effect of admixture of highly siliceous rock on working qualities of fireclay; (i) most suitable construction of retorts to withstand sudden temperature fluctuations and to render them impervious to the passage of gases through the retort walls.

Preventable Waste of Coal

Prominent Engineer Calls Attention to the Tremendous Loss of Fuel Through Inefficient Methods in Boiler Plants — Suggests Improved Methods

With the hope of quickening the campaign for the conservation of fuel during the war and in order to get the problem generally before those who are immediately interested, the U. S. Bureau of Mines, is sending to parties concerned an article by David Moffat Myers on, "Preventable Waste of Coal in the United States; with a Consideration of Alternative Methods of Its Elimination." This article was presented at the annual meeting of the American Society of Mechanical Engineers in New York, December 4-7.

As a means of far-reaching economy the government of the United States should at this time apply intelligent and direct-acting efforts to the conservation of fuel at the industrial plants which are responsible for its greatest consumption. It is unnecessary before a body of engineers to show proof that coal is wasted in vast quantities in the boiler furnaces of many plants, to feed which it is mined and distributed at a high and ever-increasing cost of labor and material.

The mining and distribution of coal have been placed under the supervision of war coal board in order more nearly to meet the crying needs in these directions, to use the railroad facilities more efficiently so that the present car shortage may be minimized to the greatest possible extent, and to apportion the coal in quantity and to uses deemed most expedient.

While this organized effort to bring about efficiency in the production and distribution of coal is being made, no parallel measures have been adopted to bring about a normal and practicable efficiency in its use. The hundreds of large plants which are consuming fuel wastefully, in many cases more wastefully and carelessly than ever before, are directly and needlessly causing a large fraction of the existing car shortage. They are overloading the already strained capacity of the railroads; they are rendering slower and more difficult the transportation of food and other vital commodities, and in short they are simply counteracting the measures of efficiency in production and distribution which have elsewhere been established.

Preventable Waste of Fuel.

The preventable waste of fuel in the boiler furnace of one steel mill amounted to 40,000 tons per year, which at $5.00 a ton would cost $200,000. This was a comparatively modern plant. The efficiency of boilers and furnaces in a 14-day test was 55 per cent. The load factor was unusually favorable to high efficiency and could readily be raised to 70 per cent. or over. This is only one example and there are many more extreme cases. In one hand-fired plant the evaporation was raised from 6 to 9 lb. in a few days of instruction, and continuously kept close to this higher mark with the help of coal and water measurements which were inaugurated. The saving was due exclusively to instruction and consequent better operation.

The saving or wasting of one-fourth of the coal consumption of any industrial plant depends entirely upon the efficiency of its operating management. Let me emphasize that this fraction of the consumption relates exclusively to the boiler plants, i.e., the production of steam; and does not include the large economies possible in connection with its distribution and use.

For well-known reasons the boiler plant offers the more lucrative field for producing economies, and these with a minimum of alteration in physical equipment. Under present conditions a plant which carelessly operates at an efficiency of 40 to 50 per cent receives from the government the same consideration in the delivery of coal as the one whose efficiency is 70 to 75 per cent. This obviously is unfair as well as wasteful. The government hands over, say, 200,000 tons of coal a year to a plant owner, but asks for no account as regards its consumption, nor any questions as to the amount of steam it is made to produce. There is nevertheless an equivalent amount of steam this fuel is capable of generating, and it can and should be made to produce that quantity.

Conservation Methods.

The object of this paper is to open a discussion which it is hoped will ultimately lead to the formulation of definite recommendations of means for the reduction of the present great preventable waste of fuel in our industries; to direct such means principally toward the elimination of that portion of the present waste which is due to faulty, careless and uninformed operation of plants; to forward these recommendations to the proper governmental authorities as an official communication of this society, and to offer to the government the services of the society for the organization, furthering, and, as far as possible, the execution of the plan which may as a consequence be adopted.

In general, there are two plans of operation worthy at least of consideration. One might be termed the autocratic method. This would involve the use of authority to compel coal consumers to execute such measures of economy as the proper authorities might prescribe for any given case. Limits to be set as to expense to the user. Such limits might be in terms of a percentage of their present yearly coal bill. Alterations to be directed chiefly, as previously implied, to purely operating improvements. Many objections would probably be made by consumers against this plan, but once in effect the majority would no doubt realize its pecuniary advantage to themselves. But its tendency may be too strongly opposed to democratic principles.

The other plan would be largely an educational one, in which patriotism and efficiency would furnish the motive forces required. The teaching must be accomplished with the utmost simplicity and directness. Above all, it must be in such form as to be readily comprehended and applied. This is a big task, but with the technical and executive ability represented in this Society, these things should be and can be accomplished.

The requisite information must reach the owners and managers of industries, and there must be simple instruction sheets for the engineers and firemen. The vital importance of daily accurate records of coal and water must be taught and information given regarding practical appliances for automatic measurements of both. Blank forms might be sent in advance to plant owners in order to be advised by them, first, whether they would be willing to co-operate with a governmental organization offering to assist them in reducing their coal consumption, and second, to obtain such data as to size, type, equipment, operation and fuel consumption of the plants as would enable a classification which would permit a government board of experts to send such instructions as would include the information needed for any one class of plants.

This work would be greatly aided by a staff of experts ready to visit plants when so requested by owners and make investigations and recommendations and keep in touch with the progress of economies. Included in such a staff should be men intimately familiar with practical operating economies whose duties would be the delivering of lectures or talks, which should be planned so as to reach directly not only managers and owners of the industries, but also the chief engineers and firemen of the boiler plants. This feature of the plan, by itself, would undoubtedly result in great savings.

The U. S. Bureau of Mines has for a number of years engaged in obtaining and disseminating scientic information regarding the mining and consumption of coal, and the results of the work have been of great value to technical engineers who are able to use and apply it. It is evident that we now require an extension of the idea of education, but in such form as directly to affect the men who run the boiler plants of our country, for in their hands is the saving or wasting of one-fourth of our fuel supply.

The GAS REC

PUBLISHED THE SECOND AND FOURTH WEDNESDAY OF EACH MONTH
THE GAS PUBLISHING CO., 20 W. JACKSON BLVD., CHICAGO

Vol. 12, No. 12 CHICAGO, DECEMBER 26, 1917 $2.00 a Year

Increased Rates Imperative

Gas Companies Find It Necessary to Make Their Revenue Greater to Meet Growing Costs in Construction, Manufacturing and Operating Sections

Each week develops a new list of gas companies which have found it necessary to advance their rates to meet the increased cost of men and materials. The more important items received since our last issue have been grouped herewith for the benefit of those interested in the situation—and what gas man is not?

Following a petition to the state railway commission, the Waukesha (Wis.) Gas and Electric Co. has been granted the following increased gas rates:

First 10,000 cu. ft. per month (gross)	$1.45
Next 15,000 cu. ft. per month	1.25
Next 25,000 cu. ft. per month	1.15
Next 50,000 cu. ft. per month	1.05
Over 100,000 cu. ft. per month	.90
Over 200,000 cu. ft. per month	.80

The new schedule is a raise of practically 15 cents over old rates, and is the first given the local company since the establishment of the commission. In 1913 the city asked a reduction in rates, but was refused. The only increase not granted was for quantities over 100,000 cubic feet. The company asked for 95 cents.

Toledo is considering an increased schedule of gas rates filed with the Public Utilities Commission by the Northwestern Ohio Natural Gas Co.

The Equitable Gas Co., Allegheny Heating Co. and Monongahela Natural Gas Co., operating in Pittsburgh and other parts of Allegheny, Armstrong, Greene, Washington and Westmoreland counties, filed with the Pennsylvania commission a new tariff of rates for natural gas which became effective on December 24, 1917. An advance from 25 to 27½ cents per thousand is asked for domestic supply and prepayment metered gas is to be raised to 25 cents for 800 cu. ft. For industrial purposes, 26 cents (net 16) is to apply. On January 1 the Manufacturers' Light & Heat Co., of Pittsburgh, one of the largest natural gas companies in Allegheny county, will cancel classification, rates and discounts for industrial consumers.

The Augusta (Ga.) Gas Light Co has asked permission of the Georgia commission to charge a meter rental of 25 cents a month.

Iroquois of Buffalo Asks Raise.

The Iroquois Natural Gas Co. of Buffalo, N. Y., has served notice on the city and State Utility Commission that it intends to increase its rates on January 1 by 5 cents per 1,000. The new rates are 37 cents per 1,000 for each 1,000 up to and including 10,000, and 42 cents per 1,000 for each 1,000 in excess of 10,000. Prompt-payment discount of 2 per cent. per 1,000 will be allowed on all bills paid at the company's office during business hours on or before dates specified on bills.

At South Bend, Ind., the Northern Gas & Electric Co. has applied for a straight rate of 75 cents for all gas used in excess of 50,000 cu. ft.

The Keystone Gas Co., Olean, N. Y., recently placed a higher schedule of rates in effect.

The Portsmouth (O.) Gas Co. has asked for a raise in domestic rates and the elimination of industrial rates.

The Peoples Natural Gas Co., Johnstown, Pa., has been ordered by the public service commission to file its petition for an increased rate schedule within 15 days.

A raise of 15 cents in its service charge is included in a new tariff of rates filed by the York (Pa.) Gas Co.

The Cadillac (Mich.) Gas Light Co. in a communication to the city commission says it will have to go out of business unless the commission passes an ordinance making it possible for the company to charge a higher rate.

On December 5 the following rates went into effect at Los Angeles, Calif.: 68 cents a 1,000 for the first 5,000, 65 cents a 1,000 for the next 5,000, 55 cents a 1,000 for the next 15,000, 50 cents a 1,000 for the next 25,000, 45 cents a 1,000 for all over 50,000.

The Madison County Light & Power Co. has practically doubled its rates at Carlinville, Ill.

The Richmond (Ind.) Gas Co. has petitioned for a $2.00 rate, its present schedule being $1.25.

The Defiance (O.) Gas & Electric Co. has asked for an increase in gas rates.

Hancock and Houghton, Mich. have named joint council committees for a

discussion of the increased gas rates asked by the Michigan Gas & Electric Co.

Ten Cents More per 1000 at Boston.

Boston (Mass.) Consolidated Gas Co., asking for an increase in price of gas from 80 to 90 cents a thousand cubic feet, says that during recent years it has cost the company from 48.25 to 57.11 cents per 1,000 to manufacture gas. Consumers, therefore, at 80 cents, have paid from 31.75 to 22.89 cents per 1,000 feet as interest on money invested and for building up company's plants since 1906. Any clear profits above dividends may accumulate as a reserve fund until total of this fund is 1/20th of capital stock, which would be $3,024,-920 on basis of present capitalization. During past few years there has been no payment to the reserve fund.

The Minneapolis (Minn.) Gas Light Co. recently asked the council for permission to increase the price of gas and to reduce the heat units and the candle power standard.

The Fort Smith (Ark.) Light & Traction Co. announces an increase of 10 cents per 1,000, effective January 1.

The Crystal City Gas Co., which supplies natural gas to Corning, N. Y., has petitioned to increase from 45 to 55 cents a thousand.

Though the increase they recommend is less than the Amherst (Mass.) Gas Co. thinks it should be, the selectmen of that town believe $1.75 per 1,000 with a discount of 5 per cent. for prompt payment would be fair.

The request of the Calumet Gas Co. to raise rates from $1.40 per 1,000 to $1.75, making a net rate of $1.60, will be considered at a joint meeting of the councils of Laurium and Red Jacket, Mich.

The Gassaway (W. Va.) Gas Co. has been allowed to increase its rates to 28 cents per thousand with a 2 cent discount if bills are paid before the 10th of each month. The new rate is an increase of about 4 cents per thousand.

Following announcement by the Omaha (Nebr.) Gas Co. of a raise in rates from $1 to $1.50 per 1,000 feet Mayor Dahlman directed the city attorney to draw an ordinance authorizing the city to buy the gas plant. In 1912 W. M. D. Marks, engaged as an expert by the city, reported a physical valuation of $1,500,000, plus $700,000 for intangible values, a total of $2,200,000 for the Omaha plant, and it is stated that war conditions would nearly double the Marks valuation today. The Marks valuation, contested in court by the company, was shown to be considerably lower than the valuation figures submitted by the gas company at that time.

At Scranton, Pa., the Hyde Park Gas Co. has asked for the following schedule: For a monthly consumption of less than 15,000 cubic feet, $1.15 per 1,000; 15,000 to 25,000, $1.05 per 1,000; 25,000 to 100,000, 90 cents per 1,000; 100,000 to 300,000, 80 cents per 1,000; 300,000 and over, 70 cents per 1,000. A minimum charge of 50 cents per month will be made for each meter. On the first block there is an increase of 20 cents per 1,000 and on the second 15 cents. The last three blocks show an increase of 10 cents per 1,000.

The Arkansas Natural Gas Co. proposes a raise in its rates on gas at Pine Bluff and other points in its territory.

A "readiness to serve" charge of 25 cents per month has been added by the Ohio Gas, Light & Coke Co. to the monthly bills of its consumers at Wauseon, Napoleon and Bryan, O.

The Chattanooga (Tenn.) Gas Co. is raising all its consumers to full franchise rates and eliminating certain discounts which hitherto have been allowed.

The Elkton (Md.) Gas Co. will raise its rate for gas from $1.65 to $2.10 January 1.

Increase for Western Cities.

New gas rates 20 per cent. higher than the old schedules for Tacoma, Wash., have been allowed by the public service commission. The Tacoma decision also includes Puyallup and Ruston. The commission, however, went on record as opposed to the "ready to serve" charge. For Olympia, Everett, Snohomish and Monroe the commission suspended the proposed increased rates for 10 days to give time for further investigation.

Corning Would Increase Rate.

The Crystal City Gas Co., Corning, N. Y., has petitioned the Corning common council to amend its franchise so as to permit the company to charge 55 cents per 1,000 feet for natural gas. The current rate is 45 cents per 1,000 feet. The company's franchise provides that the rate shall not exceed 50 cents. A special committee of the common council will go over the company's books to ascertain how badly the increase is needed by the company to enable it to earn a suitable return upon its investment.

The franchise for Corning stipulators that the company cannot charge more than 50 cents per thousand feet, but recent rulings of the Public Service Commission show that a franchise does not stand in the way of an increase provided the commission considers it for the best interest of all concerned that a higher rate should be charged. The commission has held that it has the right to set aside franchise provisions, and has done so in a number of cases. Increases recently were effected at Addison and Elmira.

Indiana Plants Affected.

The Northern Indiana Gas & Electric Co. petitioned the Public Service Commission for permission to increase its gas rates to large consumers in Fort Wayne, South Bend, Mishawaka, River Park, Michigan City, Hammond, Whiting and East Chicago. The proposed new rates will be 65 cents net for all over 100,000 cu. ft. used in Fort Wayne, 75 cents for all over 50,000 feet in the South Bend group, 75 cents for all over 500,000 in the Michigan City and Hammond districts.

On account of the increased cost of coal, oil and coke for running the gas plant, the Webster City (Ia.) Gas Co. has been running behind from $400 to $500 each month. The company asks permission to charge its 1,000 patrons a monthly service rate of 50 cents, meaning $6.00 extra per year to patrons and a yearly increase to the company of $6,000.

J. S. Palmer, manager of the Concord & Kannapolis Gas Co., Concord, N. C., is sending a letter to his consumers announcing a new rate of $1.85 per thousand, less the usual discount of 10 per cent. if paid on or before the tenth of the month.

The Warsaw (Ind.) Gas Co. has applied for an increase in rates.

Increase in cost of drilling wells, constructing pipe lines and operating the local plant, are given as reasons for the increased gas rates announced to take effect at Little Rock Ark., January 1. The higher rates will not affect consumers of less than 100,000 feet a month.

The Revere Natural Gas Co., which operates in Jefferson county, Pa., on January 1 will advance rates for churches, schools and domestic consumers from 27 to 32 cents for 1,000 cubic feet and allow a 5 per cent. discount for prompt payment.

The Seattle (Wash.) Lighting Co. has a petition pending for increased gas rates. Appraisal of the company's property is being made for the city by E. W. Bemis and staff.

The Consumers Gas Co., supplying Miami, Okla., with gas has petitioned the corporation commission for an increase in rates from 25 cents to 35 cents per thousand. The city commissioners have agreed.

The Wisconsin Rate Commission has placed a valuation of $88,789 on the plant and equipment of the Beaver Dam Fuel & Light Co. Last Septem-

ber the company petitioned the commission asking for an increase in rates. The reproduction value of the plant is placed at $101,792, which, less a depreciation charge of $13,003, makes the present valuation of $88,789.

An increase in gas rates of 35 cents has been announced by John D. McDougall, district manager of the Michigan Gas & Electric Co., Ishpeming, Mich. The rate per 1,000 has been $1.25 net and the new price, which becomes effective at once, is $1.60 per 1,000.

The Carlisle (Pa.) Gas & Water Co. has filed with the commission a new tariff of rates for gas, effective on December 15. The new tariff provides for a minimum meter rate charge of $1.00 per quarter and a service charge of 25 cents per quarter.

Easton Increases 15c Per 1,000.

After a hearing before the Commission of New Jersey, the Easton (Pa.) Gas Works has been permitted to place in effect a new schedule of rates which increases the price of gas 15 cents per thousand.

The Ludington (Mich.) Gas Co. has applied for a new franchise which will enable it to increase its rates to meet the advance in costs. The amended franchise calls for $1.35 per thousand until the consumption reaches 20,000,000 feet, when the rate is to be reduced to $1.30. When the consumption reaches 25,000,000 feet the rate is to be further reduced to $1.25. The new franchise probably will be submitted for approval at next spring's election.

The Medford Gas Co. has applied for an increase in gas rates from $1.50 to $1.65 per thousand.

The Elkton (Ind.) Gas Co. has filed notice to increase gas rates 50 cents per thousand, due to the increase cost of labor and coal.

Norfolk, Va., faces a raise in gas rate from $1.10 to $1.30 per thousand.

Application for permission to raise rates in Humboldt and Trinity counties, Cal., has been filed with the State Railroad Commission by the Western State Gas & Electric Co., of Stockton.

The Union Gas & Electric Co., Bloomington, Ill., is in line for a raise, although the state and city have not yet reached an agreement as to a service charge. The present rates show 50 cents as the minimum block and 95 cents as the highest. The new scale will probably show 80 cents as the lowest and $1.10 as the highest.

An increase in gas rates, effective December 15, has been announced by the Carlisle (Pa.) Gas & Water Co. The new rates are advanced from 10 to 20 cents per thousand.

The Renovo (Pa.) Consolidated Gas Co. has filed notice of new rates, including a minimum charge.

Norman S. Burcombe, for ten years manager of the North Pacific Public Service Co. at Aberdeen and Hoquiam, Wash., has resigned and will engage in business at Tacoma.

FIELD OF FINANCE

UNITED LT. AND RY. CO.

Splendid Gains Made in Spite of Generally Unfavorable Conditions.

The annual statement of the United Light & Railways Co., Grand Rapids, Mich., is by far the best showing the company has made in its career. As a result of the annual report there has developed a better tone for the stock, especially the preferred, which has recovered to around 65. In the year 1917 the gross earnings of the subsidiaries increased from $6,793,885.96 to $7,430,516.43, a gain of $636,630, but that showing is not as impressive as is the $84,812 gain in net earnings, despite a jump in the operating costs from $4,116,683 to $4,668,501, or more than $551,817. The company, after providing for $67,310 more in interest charges, which totaled $1,469,770, still was able to show net profits for the subsidiaries of $1,292,244, a gain of $17,502. Stockholders will derive satisfaction from these increases for they were made in the face of difficulties, an unusual increase in operating costs now confronting most corporations. Especially does this situation affect public service corporations, which like the railroads, are bound to certain traditional rate customs to which their communities are accustomed, and it is difficult to effect changes. Out of the earnings of its subsidiaries the United Light & Railways Co. derived $1,276,511, compared with $1,256,227 in 1916, an increase of $20,285, and received in dividends and interest on investments $576,897, compared with $467,220, an increase of $109,676, miscellaneous earnings $190,891.50, against $137,388, which is $53,522.93 more than in the previous year. The aggregate earnings of the parent company for 1917 were $2,044,300, an increase over 1916 of $183,485. After allowing for interest charges, which during the year increased from $568,629 to $677,176, and expenses of administration of $165,903, against $140,425 a year ago, there remained net earnings of $1,201,219, compared with $1,146,747, a gain of $54,472. There remained a surplus of $597,232 for the common stock after allowing $603,987 for dividends on the preferred which is $44,508 better than previous year.

Kelsey-Brewer Properties Made Fine Showing in 1917.

Gross earnings from operations of the American Public Utilities Co. (the Kelsey-Brewer interests of Grand Rapids) for the year ending October 31, were $4,048,289.33. Operating expenses and taxes for the year were $2,274,654.89, leaving net earnings from operations at $1,773,634.44. The gross income for the year was $1,858,819.84 and net income was $1,757,318.25. Dividends on the preferred stock amounted to $261,925.50.

BALTIMORE PROSPEROUS.

Gas Company in Fine Condition and Preparing for Bigger Things.

Net earnings of the Consolidated Gas, Electric Light & Power Co. of Baltimore from July 1 to Oct. 31, 1917, were $1,340,975; increase $160,231, or 13.57 per cent., over same period of 1916. In Baltimore in 1915 the public service commission established a heat value standard of 600 B.t.u. for gas and eliminated the candle power standard. The company earned in its last fiscal year ending June 30, 1917, 15.16 per cent. on the capital stock, or nearly twice the rate of dividend. Earnings for four months ending Oct. 31, 1917, show substantial increases over like period last fiscal year. The company has ample capital and has made favorable contracts to take care of all expected increases for next two years. The company's decision to make toluol means that the character of its gas, when the stills are ready for operation, will be changed from candle power standard to B.t.u. The commission recently issued an order permitting the company to change from present standard of 22 candle power to 650 B.t.u., with further option to make gas of a lower B.t.u. content, conditioned on a rebate to consumers proportionate with reduction from 650 B.t.u. standard. The company has appealed from this order, claiming the standard is too high. It is expected a satisfactory compromise will be reached. At hearings on the charge in standard, Charles H. Herty, president of the American Chemical Society stated that by September, 1918, the government will need 300,000,000 pounds of T. N. T. to take care of an army of 1,000,000. He urged that a B.t.u. standard be adopted in order that gas companies may produce toluol.

Insull Interests Contemplate Taking Over Freeport, Ill.?

Merging of the gas and electric interests in Freeport, Ill., is said to be contemplated. The Northern Illinois Utilities Co., which owns the electric lighting plant and street car lines, proposes to take over the plant of the Freeport Gas Co., owned by the Geist Syndicate of Philadelphia.

Earnings of United Gas & Electric Corp'n. from Subsidiaries.

The United Gas and Electric Corp'n, 61 Broadway, New York, receives as its proportion of the surplus earnings of subsidiary companies, for the twelve months ended October 31, 1917, $1,162,494. Total income amounted to $1,428,003. After charges of $668,787 there was a balance of $759,216 left for dividends on the first preferred stock. Balance after the dividends, which amounted to $649,936, was $109,280.

CONSTRUCTION NEWS

RICHMOND CONTRACTS LET.

Gas Machinery Co. and J. H. Gautier & Co. The Lucky Bidders.

With gas consumption in Richmond, Va., already exceeding that estimated by experts for the year 1924, the city's Administrative Board awarded to the Gas Machinery Co., of Cleveland, the contract for a 10-foot 6-inch water-gas plant at the Lower Gas Works, representing an expenditure of $53,241. The Richmond board also has awarded a contract for the construction of ten benches of nine retorts each. The contract for this machinery was awarded to J. H. Gautier & Co., of Jersey City, N. J., who were the lowest bidders, with their proposal of $9,500. The new water-gas unit when placed in operation will have a capacity of approximately 280,000 cu. ft. a day. The Lower Works now has a daily capacity of approximately 2,500,000 ft., but the entire equipment cannot be operated continuously. When a thorough investigation of the Richmond Gas Works was made recently by Forstall & Robison, they estimated the consumption of gas in Richmond for the year 1924 at 725,000,000 cu. ft. The total for this year will exceed this estimate by a considerable figure. For several years Superintendent William P. Knowles has recommended the construction of a coal gas plant. His recommendations have been approved by the Administrative Board, but the suggestions have gone unheeded by the council, and no appropriation for such a plant has been made. During the past two months Superintendent Knowles has been forced to request additional appropriations of $75,000 for coal and oil at the plant for the remainder of the present fiscal year.

Globe, Ariz., Gets New Gas Plant as Christmas Gift.

Globe, Ariz., was given a new gas plant as a Christmas surprise by Manager W. S. Sultan, of the Globe Light and Power Co. The plant has been under construction for some time but announcement of it was reserved by Mr. Sultan, who says it is the company's Christmas present to the town. The new plant is three times the size of the old works and has a capacity that will enable it to serve a city twice the size of Globe. John Beals, inventor of the plant installed, has been supervising the work. The old plant will be used as an auxiliary.

Staten Island Extensions Must Be Made by Next May.

The Public Service Commission has issued an order directing the New York and Richmond Gas Co., of Stapleton, S. I., to construct an extension to its mains to Grant City and New Dorp, Staten Island, by May 1, 1918.

Control of Empire Coke Co. Reverts to Geneva Parties.

The Empire Coke Co. has taken over the plant at Border City, N. Y., which furnishes gas to the Empire Gas and Electric Co., supplying the cities of Auburn and Geneva and the towns of Waterloo, Seneca Falls and Lyons. The Empire Coke Co. was organized by E. H. Palmer and five years ago leased to the Semet-Solvay Co., of Syracuse, which developed the by-products and sold in Syracuse 25,000 tons of coke a year. A number of improvements are under way, and it is the intention to improve the quality of gas and to distribute coke among local consumers. John O'Malley will succeed H. L. Moore as superintendent of the plant and the home office of the company will be in Geneva, instead of Syracuse.

General Gas & Electric Plant Co. Organized at Fargo, S. D.

The General Gas & Electric Plant Co. has incorporated at Fargo, S. D., for $25,000, by Fred Schulze, A. L. Costello, Herman Rabe and George Berzel. The company will manufacture and install gas and electric plants and manufacture and sell gas and electricity for light and power, with Fargo as its home office.

Anderson City (S. C.) Gas Co. Incorporates.

The Anderson City Gas Co., of Anderson, S. C., has been commissioned, with proposed capital stock of $10,000, to manufacture, distribute and sell gas. Petitioners are James H. Morris, Philadelphia; Frederick E. Lyford, Waverley, N. Y., and Charles C. Dickinson, East Smithfield, Pa.

Dallas, Tex., To Spend a Million on Improvements.

Manager H. C. Morris of the Dallas (Tex.) Gas Co. announces that the company will spend between $750,000 and $1,000,000 on improvements and extensions.

New Building for Brooklyn Union Gas Plant.

The Brooklyn Union Gas Co., 176 Remsen Street, has taken out building permits for the construction of two two-story brick gas plants, each about 38 by 45 feet, to cost $20,000.

Conshohocken Gas Co. Leases Holder to John Wood's Plant.

Counties Gas & Electric Co., of Conshohocken, Pa., has leased to the John Wood Manufacturing Co. a large gas holder and pipe connections will be made from that point to the Wood plant.

Economic Gas Co. Asks Funds for Additions and Improvements.

The Economic Gas Co., of Los Angeles, has filed application to issue $360,000 5 per cent. bonds, at 83⅓ per cent. of face value, to pay for additions and betterments to plant.

Plant at Lititz, Pa., To Be Improved and Enlarged.

The Lititz Mainheim & Ephrata Gas Co., of Lititz, Pa., has been purchased by J. L. Shall of York and Henry Dutton, of Dallastown, Pa., who plan improvements and extensions.

Improvements for St. Albans (Vt.) Gas Light Co.

The St. Albans (Vt.) Gas Light Co., represented by E. H. Gay, of Boston, Mass., is to be reorganized. The company plans improvements and extensions.

Huntsville (Ala.) Gas Plant Will Be Modernized.

Lawrence Cooper has purchased the Huntsville (Ala.) Gas Light and Fuel Co. at trustee's sale. Mr. Cooper represents Huntsville capitalists who plan a strong corporation to modernize the plant.

City Ownership of Gas Plant Discussed at Glendale, Cal.

Glendale, Cal., contemplates a municipal gas plant. City Engineer Lynch has rendered a report favorable to the project.

Steinmueller and Associates Building Government Plant.

E. W. Steinmueller, of 29 Broad Street, New York, is engaged in the construction of a big by-product recovery plant for the United States Government in Alabama. It is understood that Frank D. Moses and Stacey Bros. also are interested in the installation.

Important Extensions Ordered for Long Island Towns.

The New York and Queens Gas Co. of Flushing, L. I., has received from the Public Service Commission an order for the extension of gas mains to Douglaston, Douglas Manor and Little Neck.

U. G. I. Pleases Philadelphia Patrons.

The extreme cold weather, coupled with the acute coal shortage, compelled many Philadelphia householders to resort to gas last week, which, of course, meant a much heavier consumption for the United Gas Improvement Co. The company, according to Pres. Samuel T. Bodine, was equal to the occasion and in 24 hours broke all records in production, making 54,000,000 cubic feet. The biggest previous consumption in a single day was that of 50,280,000 cubic feet, December 5.

SELLING GAS

"Light and Heat" Campaign Successful at Terre Haute.

The Citizens Gas & Fuel Co., of Terre Haute, Ind., recently enlarged upon the idea of Gas Lighting Week and featured a "Light and Heat" campaign in which the salesmen went after heater business as well as piping and gas fixture sales. This resulted in the sale of 41 portable heaters, 135 gas fixtures and 29 house piping contracts. The publicity was confined to newspaper advertisements and window displays, which ran October 8 to 13, talking good lighting and good heating. Salesmen combed their territories for this class of business and started much other business which will be closed up. The annual consumption derived from the light and heat sale will approximate 850,000 cubic feet per year.

Rutland Railway, Light & Power Co. Develops New Uses for Gas.

The Rutland (Vt.) Railroad Co. now is using gas in its shops for locomotive tire setting and has found it quicker and cheaper than the kerosene method which formerly was used. It takes approximately 22 minutes to put on a new 72-inch tire with gas, as against 35 minutes with kerosene. With kerosene it was necessary to do all the work out doors, whereas, with gas it now is done in the shop. The same company also uses gas for heating large engine frames, prior to making thermit welds, superseding gasoline torches for this purpose, and reports a considerable saving with gas.

Radiantfire Resplendent in Rochester.

When they're roaming in the gloaming in Rochester, N. Y., the Rochester Railway & Light Co. will stop 'em with a display of Humphrey Radiantfires that is hard to beat. The line-up of the popular heating appliances, portable low-priced Humphrey Radiantfire shown at the front of the window to the de luxe appliances that now grace the fireplaces in many palatial residences. The low-priced Humphrey Radiantfires are selling at a rate that has left previous heating appliance sales records back in the shadows, according to latest reports.

The artistic design of the Humphrey heating units has given gas company window trimmers and advertising men a foundation upon which scores of beautiful and compelling displays have been made.

Rochester (N. Y.) Ry. & Lt. Co. Features Humphrey Radiantfire.

"Gasless Day" the Subject of Proposed Publicity.

Recently the writer was talking gas advertising with Irving Tuteur, head of McJunkin's Co-operative Gas Advertising Service. The conversation headed into a discussion of the Associated Advertising Clubs' film, "Mr. Noad's Adless Day." This film told of the troubles of Mr. Noad who wished that there were no advertisements. In a dream his wish was granted and old Noad had one awful time. Tuteur said he was going to use that idea and get out an advertisement in the gas service on a "gasless day," outlining to newspaper readers the discomforts they would suffer if gas were prohibited on certain days. The idea has a sure-fire appeal and we advise you to watch for the copy and use it.

Teaching Consumers To Economize on Gas in Canada.

The Consumers Gas Co., of Toronto, Can., publishes the following in its journal "Gas News," which is distributed to its patrons gratis:

If you do not get entirely satisfactory results in your baking, or from the use of any gas appliances, we will gladly have our demonstrator assist you in any possible way. Our demonstrators are especially instructed to assist all customers to get the best results at lowest costs, and to advise in planning meals, etc. We know that some women use far more raw food stuffs to prepare meals than other women do to obtain the same results. Also that some women use much more gas than is necessary to prepare meals the proper way. For this reason we are offering the services of our demonstrators to assist our customers to avoid all waste, and in so doing help the Empire.

St. Petersburg (Fla.) Municipal Gas Plant Enjoys a Boom.

The gas sales of the St. Petersburg (Fla.) Municipal Gas Plant show an increase of about 60 per cent. Fifty-two service connections were put in last month, each connection meaning at least one new customer and some of them from twelve to twenty customers in the cases of apartment houses.

Aid Colored Help

New Orleans Gas Co. Inaugurates School for Training Cooks

By A. E. Merchant

Editor's Note—Several months ago the New Orleans Gas Light Co. leased a building in its city for the education of the colored race in the use of gas for cooking purposes. It cost about $4,000 to renovate the building so that two domestic classes could be conducted at the same time, one class using the upstairs and the other the lower floor. The following details concerning the school will appear in the next issue of the United Gas & Electric Corp. Bulletin.

An important hindrance to the sale and more satisfactory use of gas as a cooking medium is the untutored colored cook. In many instances these women prepare appetizing dishes, render good service otherwise, are trustworthy and reliable, and therefore have [illegible] confidence of their employers. They do the ordering for the table and are permitted to select such kitchen equipment as pleases them. It is unreasonable to [illegible] that an unlettered servant [illegible] a rudely equipped home where modern conveniences are unknown will enter intelligently upon the management of a [illegible] gas appliances. [illegible] the manufacture of gas [illegible] it as a dread[illegible] gas range.

[illegible] southern kitchens [illegible] coal and gas [illegible]

ing satisfaction in her work prefers the coal range, the housewife readily agrees for her to do the cooking on the coal stove, allowing the gas range to remain idle, and made use of only in an emergency when the cook is away and some member of the family does the work.

New Orleans Gas Co. Opens School for Colored Cooks.

The gas range belongs to scientific cookery. To use it economically and successfully, one must know and appreciate the value of heat units and food cooked at proper temperature. Efficiency in domestic service must always mean the general and satisfactory use of gas appliances. Since most of the domestic work in the south is done by colored women, it is to the decided advantage of corporations promoting the interests of the gas industry to provide the means of breaking down the barriers created by their fear and ignorance.

The first [illegible] this educational campaign work was Tampa, Fla., which for three years has operated the Tampa School of Household Arts for the training of colored girls and women. Other towns following Tampa's lead have organized similar institutions. President Benoist, of the New Orleans Gas Light Co., attended the last convention of Southern Gas Associations, held at Roanoke, Va. There he observed the work of the Roanoke domestic science school and decided on a similar campaign in New Orleans.

Being informed that a visit to the Tampa school would give a better idea of the original organization, Mr. Benoist went there and conferred with the officials of the Tampa Gas Co., who allowed their demonstrator, Mrs. Blanche Perkins, to undertake the work of establishing the New Orleans school.

In July she began a survey of the Crescent City, and through the medium of mass meetings in the colored churches, came into personal contact with many of the cooks and servant girls of the city.

Scope of Course Offered.

To guarantee the lasting support of the ministers, it was decided that each woman applying for membership should have a card of recommendation from the pastor of one of the city churches, these cards being supplied by the company. The course for women consists of twenty lessons in cookery, covering such essentials as marketing, food values, sanitation, breads, pastries, meats, etc., special stress being laid in each instance upon the uses and advantages of gas.

The public schools of New Orleans do not offer domestic science training for negro girls. It was therefore decided to make arrangements to train them in the school provided by the gas company, since thousands of them leave school each year to earn a livelihood as cooks or maids, and thus become of much concern to the gas industry of the community.

While the public school board was not able to contribute financially to the maintenance of the work for the opening year, their moral support was gladly given and arrangements made to include the gas company's domestic science work in the curriculum for colored schools, beginning with girls in the seventh grade. A suitable building was secured and equipped and school opened October 15. There are enrolled in the classes at the present time 350 women and 400 school girls, each receiving one lesson a week. Three hundred women make up a waiting list each eagerly awaiting the opportunity to gain admission to one of the classes.

CURRENT ADVERTISING REVIEW

How do you know that Shakespeare is the greatest writer of English? Some authorities said so, years ago, and the world took their word for it. The weight of the testimony of established authorities is the strongest kind of advertising material and Geo. Allen, advertising manager of the Consumers'

Toronto Heater Publicity.

Gas Co. at Toronto, is one who knows it. Note how he uses this endorsement in the back cover of the Consumers' house organ. Copy like this would go a long way in restoring gas fires to public favor in neighborhods where they are now suffering from popular prejudice.

Just because you haven't the gas to sell right now is no reason why a gas company should let up on its use of newspaper publicity, according to public utility advertising experts. Raises in rates are imminent and the voice of the public will be raised, along with the rates, in one long grand roar of protest. That is, if the gas company is lucky enough to put across its deserved increase.

Publicity that makes the consumer a partner in the gas company—a partaker of its joys and sorrows—paves the way for any justified advance. This publicity has to get into motion some time before the proposed increase is up for action. You can't expect to cover a proposition affecting nearly every reader of a newspaper in an advertising campaign of a few weeks. One of the finest campaigns, on paper, that was ever prepared to favorably influence a rate raise, fell short of the mark, because it did not allow time enough for the mass mind to be influenced in the right direction.

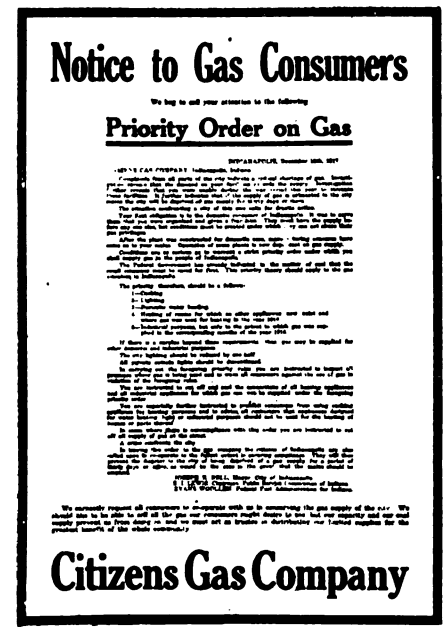
Tell your folks what gas is doing to help win the war. The columns of this paper are full of material that you can retell to your public in snappy advertising form and win for you an appreciation of the gas business.

One of the large gas companies in recent advertisements for employes makes capital of its pension system, sick benefit, vacation, insurance and policy of promoting its employes. These inducements are not innovations with this company and should prove an inducement to those seeking permanent employment.

These days, gas heater advertising doesn't have to make a frenzied grab for public interest. Just a plain statement of fact is bound to get the attention of the chilled citizens. The Gas & Electric Co. at Baltimore takes big space and fills it with copy that guides the prospect to the proper conclusion, "Order a Gas Heater Today." Newspaper advertising will prove its ability to cut selling costs if used strongly on gas heating appliances at the present time.

Baltimore Gas Heater Ad.

From Indianapolis comes something new in gas company advertising. Shortage of coal and insufficient plant capacity has forced the Citizens Gas Co. of that city to take immediate steps to conserve its gas supply for domestic consumption. The letter incorporated in the advertisement reproduced herewith is from the public service commission of Indiana and directs the company to give



Indianapolis Priority Ad.

priority to the following classes of gas consumption: (1) Cooking; (2) lighting; (3) domestic water heating; (4) heating of rooms where no other appliances now exist and where gas was used for heating in 1916; (4) industrial purposes but only to the extent to which gas was supplied in the corresponding months of 1916.

For more than a month the Kansas City office of the Empire Gas & Fuel Co. has been issuing a series of advertisements explaining in news style the developments in the natural gas situation in Kansas. The series was prepared at the Kansas City office, under the direction of R. E. Morrison, Doherty representative in that city, who distributed them to sixty newspapers. The advertisements have been appearing in practically all of the daily newspapers in the towns in which the Kansas Natural Gas Co., the Wichita Natural Gas Co., the Quapaw Gas Co. and the Wichita Pipeline Co. do business. Through these advertisements the Empire Gas & Fuel Co. has been

talking daily to a million and a half people. Mr. Morrison reports that he has received letters from many editors complimenting the company on the advertising, and saying that it is an entirely new style. The editors also say that they know that the public is appreciating the attempt to describe the difficulties and hard labor necessary to bring a supply of natural gas to a city.

The series of advertisements began a little more than a month ago, and a new one has appeared in the sixty newspapers every day since then. One of the novelties of the advertising is the printing of a daily weather report immediately under the headline of the advertisement, which adds to its drawing power. An idea of the character of the advertising may be obtained from the titles of the advertisements, some of which follow: More Gas on the Way; Labor Shortage Is a Gas Problem; Pipe for New Gas Lines Was Scarce; A Small Army Laying New Lines; Cost of Gas Improvements; Pipe Line Through a Wilderness; Pipe Line Penetrates Hills; Two Hundred Miles in the Night to Speed Gas; Pipe a Man Can Crawl In; Ditching Machine a "Tank" of Peace; The Nerve Center of the Gas System; Telephone Wires Knit Together the Gas System; The Slumbering Devil in the Gas Main; A "No Man's Land" in Kansas; They Work Well Because They Eat Well; etc.

An example of the type of advertising used is the following, which is reproduced in the exact form in which it was sent to the sixty newspapers for publication:

PIPE LINE THROUGH A WILDERNESS.

Weather Report.

(Copy for report to follow by wire on day of publication.)

The wild, rocky, forbidding hills of the Osage Nation offer a stubborn resistance to the men who are laying new pipe line to bring you more gas.

The line from the Osage-Hominy field, which starts southwest of Bigheart, Okla., will pass through rugged country for practically its entire length —a distance of fifty miles. The line does not dodge the hills; pipe is too scarce for that. It passes over them, often reaching a grade of 75 per cent. It goes up one hill and down, only to approach another, which must be passed in a similar way.

They are hills of flint rock mainly, over which ditches can be opened only by blasting. Tough Jack oaks, which must be cleared away before dynamiting begins, add to the construction gang's difficulties.

INDUSTRIAL GAS PROGRESS

British Engineer Points to Great Strides Made in Its Application in Factories.

This is a day of miracles, but we live so near to them that they fail to arouse our wonder and astonishment, says H. M. Thorton in an article on industrial gas in the "London Gas World." Future generations will better appreciate the astounding work that has been done by the industries of Britain under the strident and inexorable claims of war. Where we thought in hundreds, we now think in thousands; where thousands represented the summit of our ambition, we now accept millions as a normal standard. A year's output is now compassed by a month; the impossibilities of yesterday have become the achievements of today, and will be forgotten tomorrow in the striving after greater things. We can be proud of living in these times, and of taking a share in the stupendous events which are shaping the destinies of Europe and our empire, not only politically, but industrially, for years to come.

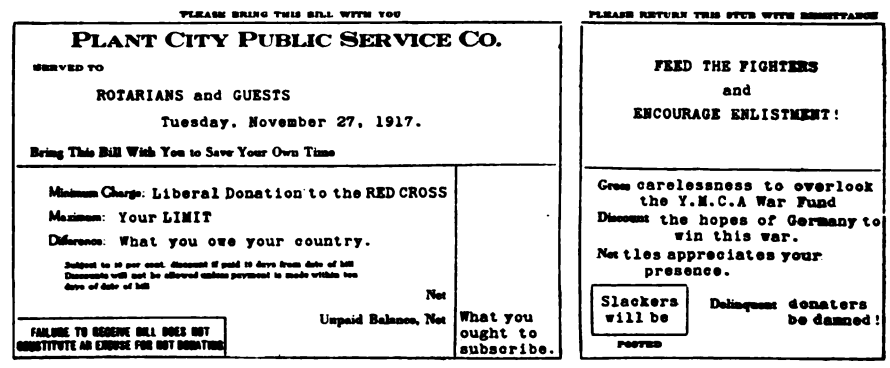
Simplicity of Application.

Why is it that gas for industrial purposes has found such wide acceptance? What qualities does it possess to make such an irresistible appeal to the manufacturer of the present day? First, undoubtedly, because of its ease of application. A manufacturer anxious to add to the output of his factory, or, perhaps at the desire of the ministry of munitions, to undertake entirely new work, finds in the gas furnace an immediately available appliance for heat treatment. He need make no structural alterations to his factory, nor build a smoke stack. No foundations are necessary, no provision has to be made for extraction of smoke, soot or dust from the work shop, no valuable space has to be allotted to the storing of fuel or ashes, no anxiety is caused over irregular supplies of fuel or of its heat value. The gas furnace can be placed in any floor area available, the gas supply (and if necessary the air supply) connected, and the additional or new work commenced at once, with a certainty that the heat treatment will be accurate and the output unfailing. This simplicity of application probably makes the strongest and most direct appeal to the manufacturer; but there are many other advantages possessed by the gas furnace—that of the economy in labor, the economy in space, the constancy of action, the speeding up of output, and the absence of spoilt work or rejects owing to irregular heating.

Roscoe Nettles Pulls Good Publicity Stunt for War Funds.

Roscoe Nettles, manager of the Tampa (Fla.) Gas Co., was the host of the Tampa Rotary Club and Hillsborough county farmers at a recent dinner given at Plant City, Fla. The dinner was given to celebrate the opening of a new ice plant, in which Mr. Nettles was the moving spirit. The new plant makes it possible for residents of the community to put local meats in cold storage and makes the neighborhood practically self supporting at meal time. The only foreign item served at the Nettles party was the coffee.

Upon every occasion Mr. Nettles jumps at the chance to link his public utility operations with the public weal and this banquet was no exception. Each guest received a slip that was suspected to be a gas bill, on first sight. It proved to be a solicitation for the Red Cross and Y. M. C. A. war funds. This slip is reproduced herewith for the suggestion it may make to other gas company managers and advertising men.


PLEASE BRING THIS BILL WITH YOU

PLANT CITY PUBLIC SERVICE CO.

SERVED TO

ROTARIANS and GUESTS

Tuesday. November 27, 1917.

Bring This Bill With You to Save Your Own Time

Minimum Charge: Liberal Donation to the RED CROSS

Maximum: Your LIMIT

Difference: What you owe your country.

Subject to 10 per cent. discount if paid 10 days from date of bill. Discounts will not be allowed unless payment is made within ten days of date of bill

Net

Unpaid Balance, Net

What you ought to subscribe.

FAILURE TO RECEIVE BILL DOES NOT CONSTITUTE AN EXCUSE FOR NOT DONATING

PLEASE RETURN THIS STUB WITH REMITTANCE

FEED THE FIGHTERS

and

ENCOURAGE ENLISTMENT!

Gross carelessness to overlook the Y.M.C.A War Fund

Discount the hopes of Germany to win this war.

Net tles appreciates your presence.

Slackers will be

Delinquent donaters be damned!

POSTED

Gas Bill Publicity Assists Red Cross and Y. M. C. A. War Funds.

W. T. Waters, former advertising manager of the Atlanta (Ga.) Gas Light Co., now is a first lieutenant in the field artillery stationed at Ft. Logan, Houston, Tex.

GILBERT

INSURE YOUR INDUSTRIAL REVENUE

SYSTEM of AUTOMATIC TEMPERATURE CONTROL

For Temperatures 120°F. to 3000°F. Any System of Combustion and Any Form of Apparatus Using Gas Fuel

During the month of November, THE GILBERT SYSTEM OF AUTOMATIC TEMPERATURE CONTROL was installed and put into successful operation in more manufacturing plants and for more purposes than during any previous month and during the first 10 days of December the orders received are much greater in number and value than was true during any previous like period in our history.

To meet the exact specifications which form a part of all present day contracts covering metal parts or any other material requiring any kind of heat treating process means that you must employ that form of heat control that will to a certainty accomplish your purpose without dependence on the human factor.

THE GILBERT SYSTEM OF AUTOMATIC TEMPERATURE CONTROL will accomplish the results your client requires. It has the approval of highest authorities in this country. It is the standard from which other forms of heat control are judged and when your engineering specification sets forth that you are to furnish with any gas fired equipment THE GILBERT SYSTEM OF AUTOMATIC TEMPERATURE CONTROL—or equal, it will be the GILBERT SYSTEM and the GILBERT SERVICE because both are without equal for any one of the thousand purposes for which THE GILBERT SYSTEM OF AUTOMATIC TEMPERATURE CONTROL has been standardized.

Send us your bonafide inquiries. Consult us regarding your heat treating problems.

H. E. GILBERT COMPANY, Inc.

50 CHURCH STREET NEW YORK

Merge by March

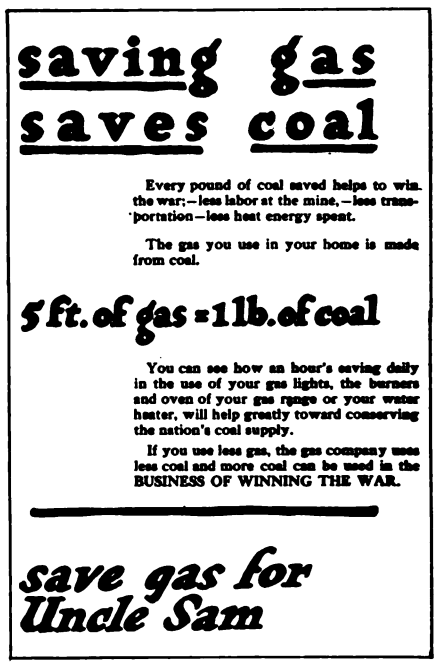
American Gas Association Now Assured by Action of Directors

The best posted individuals among those active in uniting the two national gas associations into the American Gas Association predict that by next March the big new organization will be in full swing, and both the N. C. G. A. and the A. G. I., as unit associations, will belong to history. Their present memberships will be preserved as the Commercial Section and the Engineering Section, respectively, of the American Gas Association. A third section will be composed of the members of the present Manufacturers' Section of the N. C. G. A., while a fourth section will be formed later to be known as the Accounting Section.

These are the principal parts of the merger plan as approved in New York, December 13th, by the directors of the N. C. G. A. and the A. G. I. in joint meeting. It is therefore a formal certainty now that the long planned union of the two national gas associations is accomplished, and all that remains to bring the American Gas Association, as the new organization has been officially named, into active existence is a joint meeting of directors, at which a constitution and by-laws will be adopted and active officers elected and installed. This, it is understood, will be done early in 1918, so that by the first of March the new gas association will be actively engaged in its highly important and helpful work in the gas industry. The problem of working out a constitution and by-laws is now being worked on by the two sets of directors.

At the first meeting of the directors of the American Gas Association, of whom there will be twenty-three under the plan as approved, a permanent secretary will be elected. This office, of course, carries with it the most important duties that any executive of the association will be called upon to assume. It is therefore the determination of those interested in the merging process to carefully weigh the qualifications of every man available for this work and to choose a man whose executive ability is already proved and whose experience has been sufficient in all departments of the industry to equip him for the job of adequately serving the association. The position of secretary will carry with it, of course, a salary commensurate with the capacity of the man who fills it. It will be one of the most conspicuous and one of the best salaried places in the gas industry. Louis Stotz, of New York, is secretary of the N. C. G. A., and George Ramsdell, of New York, is secretary of the A. G. I. Whether one of these able officials will be promoted to the new position is, of course, not determined yet, nor has the selection of some one else been discussed, so far as could be ascertained. Each section in the new association will have its own paid secretary. The chairman of each section will automatically become a vice president of the association. All other officers will be elected by the membership annually.

THE GAS RECORD, exclusively, has given from time to time all the important news of the steps that have been taken in this merger plan since its inception.



Michigan Gas Ass'n Publicity.

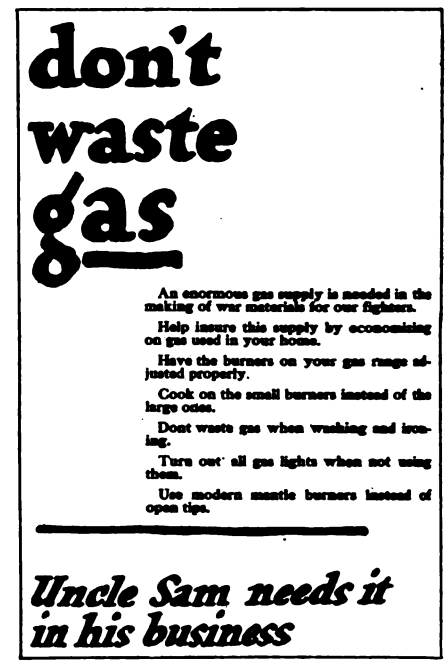
New Water Gas Addition for Buffalo's Artificial Plant.

The Buffalo (N. Y.) artificial gas plant, recently bought by W. J. Judge, the New York gas magnate, is to have $100,000 spent on improvements. A new water-gas plant is being constructed which will give the plant an increased capacity of 3,000,000 cu. ft. per day, raising the total daily output to 6,600,000 cu. ft.

Michigan Gas Association Issues Valuable Publicity.

The Michigan Gas Association committee, composed of Burton Laraway, Richard Fowler and Clark Graves, has issued some valuable publicity matter for the purpose of assisting Michigan gas companies that are now confronting, or may in the future confront, gas shortage. This advertising matter consists of four hand-lettered plates, to be ordered by number, at a cost of 75 cents a plate. These plates read: (1) Save gas for Uncle Sam. (2) Uncle Sam needs it in his business. (3) Saving gas saves coal. (4) Save your gas for cooking and lighting. (5) 5 ft. of gas = 1 lb. of coal. (6) Don't waste gas. (7) Warning.

Suggestions for complete advertisements educating customers how to conserve gas also are included in this material, full details of which may be procured from Clark R. Graves, sec.-treas., 110 E. Michigan Ave., Lansing, Mich.



Another Ad. in Michigan Series.

Death of M. G. Reynolds, of Reynolds Gas Regulator Co.

Gas men everywhere will learn with sorrow of the death of M. G. Reynolds, president and general manager of the Reynolds Gas Regulator Co., which occurred at Anderson, Ind., December 12th.

The company will continue business under the able management of J. C. Groble, who has been Mr. Reynolds' associate and active assistant for many years.

OPINIONS *AND* COMMENTS

PRICE OF COAL TAR.

Gas companies never have got the price they should for their tar.

It is, of course, worth more today than ever before, as the buyers, who refine it, are selling their products at fancy prices for explosives, chemicals, perfumes and various other purposes. The attitude which the large tar-buying companies maintain toward gas companies is that of paying, always, as little as possible. Last week THE GAS RECORD undertook to obtain market quotations on gas works tar and met with either flat refusals or evasive answers. The buyers evidently want to deal with each gas company separately and secretly. They want no company to know what the other is getting and above all they fear a general understanding in the gas field as regards the value or a standard price on tar. In these days when it is imperative that gas men get every cent that is coming to them, this situation is intolerable. It can be overcome by publicity. For this purpose THE GAS RECORD gladly offers the free use of its columns. If you will write us, stating the price you are now getting or being offered for your tar, and quoting the terms of the contract that has been submitted, we shall be pleased to publish a summary of the replies we receive, omitting the name of yourself and company, as well as your location, other than the state. Team work is needed on this proposition. Let's get together and see if we can't establish a market price for tar—and, while we're about it, undertake to get somewhere near what it's really worth.

If the generating capacity of the plant has been reached, don't disorganize the new business department—increase the capacity with more machinery. The output of coal mines and oil wells is growing larger all the time, and water gas sets are always available.

THE GAS RECORD wishes its readers—3,300 of the world's best gas men—a Merry Christmas and a Happy New Year.

May a righteous peace be secured for all nations before another Christmas rolls around.

It ain't the guns nor armament
Nor funds that they can pay,
But the close co-operation
That makes them win the day.

It ain't the individuals
Nor the army as a whole,
But the everlastin' team work
Of every bloomin' soul.

—*Kipling.*

The GAS RECORD

Vol. 12 No. 12 — CHICAGO — Dec. 26 1917

Entered as second-class matter at the post office at Chicago, Illinois, under the act of March 3, 1879.

W. H. Graffis . . . . . *President*
H. D. Fargo . . . . . *Vice-President*
H. B. McMeal . . . . . *Secretary*
Herbert Graffis . *Treas. and Adv. Manager*
Milt Saul . . . . . *Vice-Pres. and Editor*
Walter V. Turner . . . *Technical Editor*

SUBSCRIPTIONS

The subscription price of THE GAS RECORD is $2 a year in the United States, Cuba and Mexico; in Canada it is $3; in all other countries, $4; single copies, U. S. A., 25 cents.

ADVERTISING

THE GAS RECORD is issued the 2nd and 4th Wednesdays of each month. Copy can be accepted as late as the Monday previous to each issue. Where proof must be seen, allow ample time for transmission in the mails.

Display Advertising—Rates on application. Classified Advertising—"Wants," "For Sales," etc.—5 cents a word per insertion, minimum charge $1.

GOVERNMENT OPERATION.

The railroad follies of 1917 are truly more stupendous than ever before. With two or three years' warning, the roads have continued to perpetrate one colossal blunder after another until now the nightmare of government ownership stares them in the face. The one thing that can save them from a richly deserved fate is the president's ability to pluck the flower of principle from a putrid mass of corporate filth and transplant it, with careful hands for protection. President Wheelwright of the Consolidation Coal Co. is right in advocating government seizure of any property or individual who doesn't do full duty as speedily as possible today, but we believe that America still boasts enough good business men of integrity and energy that permanent government ownership would be a mistake. Government control during the war is as far as we should go. The assumption that the Government could take over utilities and industries on a large scale, even by confiscation, and supply service and products more cheaply than they can be bought of privately owned industries is purely an assumption. The record of Government operations does not justify the hope. It is true that, during the war, economies may be effected and gains made by bringing competing service and industry into harmonious relations under Government supervision, but this is something far from Government management. By the time peace is established, it is to be hoped that many more important lessons will have been learned and a host of errors and abuses eliminated. With peace would come politics again—and politically manipulated railroads would make the worst of private railroad ghouls seem like angels.

HIGHWAYS WILL HELP.

Anything that will help relieve railroad congestion and facilitate the transportation of coal, coke, oil, construction materials and appliances is of vital interest to gas men. The war highways movement is therefore a project which should have the aggressive support of our industry. The American Association of State Highway Officials at their meeting in Richmond December 4th endorsed the plan of calling upon the dominant commercial bodies in the cities of their respective states for assistance in gathering data for the proposed war highways. That they will receive a prompt and effective response is certain. Obviously, the highway that will prove of most service will be one for relatively short hauls—60 to 80 miles—transportation being most economical when the trucks are loaded in both directions. What that traffic will be conditions. As regards the very important matter of maintenance it may be noted that the state highway departments may obtain assistance from the state councils of defense, which already have been asked to look after the maintenance of routes to the seaboard and to keep the Lincoln Highway open. We suggest that the gas company of every important town and city of the United States should lend its active support to the war highways movement. If no one else takes the initiative, start it yourself.

SPEED THE WORK.

Baltimore recently was reported as one of the cities where the government would co-operate with the gas company in the recovery of by-products for explosives. A letter just received from an official of that company declares, however, that no such arrangement has as yet been made. Knowing the ability and reputation of the government's experts in this department, we feel sure they must be doing all that is humanly possible to expedite matters. The Government's requirements in benzol and toluol appear immediate and urgent, and many opportunities seem open in the gas field for utilizing quantities of crude explosive material that hitherto have either gone to waste or been sold for a song. We hope for news shortly of a speedy and general development along these lines.

PLANT CAPACITY.

It would seem the time has come for many gas companies in this country to tackle the problem of increased plant capacity, even though it is not the most promising period in history for the job. What else can solve the difficulty of supplying gas to the community in adequate quantities? And to supply it in adequate quantities is what every gas company pledged itself to undertake when it accepted its franchises from the community.

There are companies, of course, dwarfed in their endeavors by a scarcity of coal, oil and other materials of gas manufacture, and by the prevailing prices of these materials. To these companies the task of keeping the old holder up is only temporarily burdensome—and time seems to be the friend of these companies in their adversity. Their trials grow less as time advances, it seems—what with higher rates granted by commissions in some instances, government aid in providing raw materials in other cases and sheer natural ability to work out of difficulties assisting in all situations.

Nevertheless, there are situations wherein a reluctance to enlarge or extend during war conditions prevails to an unreasonable degree. Managers and financiers who are responsible for these situations are respectfully reminded that while they wait, other methods and other commodities than gas are edging their way into the public esteem, and unless some action is begun right soon it may transpire that future enlargements and extensions will come too late. The demand for gas may be satisfied with other elements. This is a condition that must be always most carefully considered. To overlook it, or to underestimate its importance, is little short of financial suicide, in our humble judgment.

At the present time there is scarcely a situation in the United States, where the supply of gas meets the demand for it. In a majority of cities there is a clamor for more gas, for lighting, heating and for power. In many places, and not solely in the natural gas belt, either, the company has been forced to shut off industrial consumers in order to provide gas for the more necessary domestic uses.

Gas has come into its own these days. No longer must the gas man make numerous trips to his prospective customer in order to persuade him that his lighting, heating and industrial work can be done better and at less cost with gas than with any other method. All this is well known now to the general public that keeps itself informed, thanks to the active propaganda spread during the past five years or so in favor of gas. Universally its merits are patent to everyone. The main problem, then, is to supply the gas our educational efforts have sold.

Clearly, it cannot be supplied to the newly created demand by the old inadequate plants. Yet it must be made and sent out, eventually, if not now. Why the prolonged delays on the part of some of our financiers and managers?

GET IN LINE.

Apart from those which have secured increases recently, few gas companies in the United States are getting living rates today. Appreciation of this fact is moving scores of companies all over the country to insist upon immediate advances, as will be noted from the leading article of this issue. Others, which have not yet taken the necessary action, will be doing so within the next few weeks and we hope to see the industry soon reestablished on a comfortable basis. That condition is essential if the gas is to maintain its rank as the nation's greatest utility servant. Perhaps more people in every important city are interested in satisfactory gas service than in any other item in their daily lives—a fact which they themselves hardly ever think of, unless something about the service goes wrong. Possibly, this is a fault in part, of the gas companies themselves. If the local public were told repeatedly how many citizens of their community used gas, what the total consumption amounted to each year, how much money was invested in the plant and the amount of taxes paid, possibly the importance of the utility would be better realized and people would be more willing to treat it fairly. After all, what the public wants is service—its terms and conditions become secondary. As the Lexington Leader recently said, when complaining of a shortage of natural gas in Kentucky: "people as a rule do not complain as much about the high cost of an article as they do about unsatisfactory service." The statement is true, and it's a mighty good argument to use in the present movement for adequate gas rates.

NATURAL GAS DEVELOPMENTS

FEAR GAS FAMINE

Many Wells Sunk Past Season in Pennsylvania Have Proved Failures.

A dispatch from Bradford, Pa., says grave fears are entertained that many counties in northwestern Pennsylvania will suffer during the coming winter from gas shortage. During the last five months the Manufacturers' Gas Co., Pennsylvania Gas Co. and the United Natural Gas Co., which companies supply virtually all the cities and towns in that section of the state, have done extensive drilling that has been anything but a success. Thousands of dollars have been lost in the search for gas, as many dry holes were struck, and at the present high cost of drilling a dry well means the loss of from $4,000 to $5,000.

Producers' Gas & Fuel Co. To Use $100,000 for Construction Work.

The Producers' Gas & Fuel Co. has been authorized to issue 1,000 shares of stock of the par value of $100 per share, such stock to be sold at not less than 80, proceeds to be used in the construction of applicant's natural gas transmission and distributing system in Kern County, California.

Big Development Carried on by Valley Natural Gas Co.

Since the Valley Natural Gas Co., of Bakersfield, Calif., took over the California Natural Gas Co. July 1, 1916, over $25,000 has been expended for capital account, and $55,000 additional from earnings put into betterments. In addition to this, $60,000 of a bond issue was applied to the development of the business through the installation of gas pipelines, etc. The Valley Natural Gas Co. operates extensively from the Midway oil field.

Arkansas Natural Gas Co. Gets 10,000,000 ft. More Per Day.

The Arkansas Natural Gas Co. is connecting a line with a well of another company in Louisiana, which will provide the Arkansas company with about 10,000,000 additional cubic feet a day, reports Supt. J. R. Munce.

New Home for Quapaw Gas Co. at Bartlesville, Okla.

The Quapaw Gas Co. will occupy as its headquarters six floors of the eight-story Masonic Temple building now being built at Bartlesville, Okla.

Fire Damages Meter Shop of Dunkirk (N. Y.) Gas Co.

Fire did extensive damage recently to the meter plant of the South Shore Natural Gas Co. at Dunkirk, N. Y. recently. Timely discovery by a patrolman saved the main building from destruction. The entire stock of meters and gas apparatus was damaged.

Keener Natural Gas Co. Buys Weston (W. Va.) Plant.

The public natural gas franchise at Weston, W. Va., has been purchased by the Keener Natural Gas Co. of that city from the Weston Gas Co. for a consideration of $60,000. All the pipes, mains and meters are included in the transfer but none of the Weston Gas Co.'s gas wells.

Big Earnings from Casinghead Gasoline.

Columbia Gas & Electric Co., Huntington, W. Va., embarked in the gasoline producing business last summer and by adding successive units to its compressor plants finally obtained a high record production of 308,640 gallons of casinghead gasoline in the week ending November 16. Since the beginning of operations in the summer of 1916 the company has produced 12,000,000 gallons of gasoline and during 1918, the company expects to produce a minimum of 1,500,000 gallons of high gravity gasoline monthly, which will increase the company's gross receipts by more than $250,000 monthly at the current market price for natural gas gasoline.

Two Pensylvania Gas Companies Acquired for $75,000.

H. J. Slicker, of Knox, Pa., has bought for the Jefferson County Gas Co. the Baden Gas Co. and the Slicker, Lucart & Co. gas plant, both located in Jefferson and Forest counties, near Clarington, in a field that has been developed during the past five years. Consideration, $75.000.

Householders Asked To Help Conserve Natural Gas.

"Cut heat from all rooms not absolutely necessary," is the appeal issued to householders through natural gas companies following a request from the Natural Gas Association of America for conservation of fuel in every possible manner, to aid in the manufacture of munitions and war materials.

M. C. Park Made Manager of the Dixie Gas Co.

The Dixie Gas Co., of Birmingham, Ala., on December 1, formally took over the Aldrich dome property of the Gulf Producing Co. of Alabama. M. C. Park has been made general manager of the Dixie company, and has taken active charge of operations. He has had some 25 years' experience in the gas and oil business.

Lewis Run Gasoline Co. Organized at Bradford, Pa.

Lewis Run Gasoline Co. has been organized at Bradford, Pa., capital $400,000, to deal in gasoline, gas and petroleum products. A. R. Johnson, H. D. Yates, A. J. Wise, Bradford, Pa., are incorporators.

West Virginia Governor Sounds Warning on Natural Gas.

Governor Cornwell of West Virginia says two-thirds of West Virginia's annual production of 300,000,000 cubic feet of natural gas is being brought into the Pittsburgh district, thus causing a shortage of gas in his state. While admitting that Pittsburgh capital has been largely responsible for development of oil and gas properties in his territory, Governor Cornwell declares West Virginians are "expecting the gas companies to take care of their requirements without action on the part of the state to coerce them."

Natural Gas Franchise Pending at Hot Springs, S. D.

The Alum Creek Petroleum Co. has presented the draft of a gas franchise for the city of Hot Springs, S. D. P. F. Ward is city attorney.

Cowley (Wyo.) Gas Co. Organized —Town To Be Piped at Once.

A franchise has been granted to the Cowley (Wyo.) Gas Co., and the company already has completed arrangements for piping the city. Cowley is one of the booming towns of Wyoming and considerable drilling is being done near there.

Giant Gas Well Struck in Jefferson County, Pa.

A giant gas gusher recently was struck on the farm of A. E. and M. S. Galbraith in Jefferson county, Pa., by the United Natural Gas Co. The well, which is producing at a rate of 13,000,000 cubic feet, is the largest ever struck in Jefferson county and the second largest in that section of the state. The well was struck at a depth of 2,720 feet.

Improvements for Cambridge (Ind.) Natural Gas Co.

The Cambridge (Ind.) Natural Gas Co. has filed a petition with the Public Service Commission asking permission to issue $60,000 preferred stock to pay for improvements.

Artificial Plant Wanted to Supplement Natural Gas Device.

Lexington, Ky., has begun an agitation for an artificial gas plant, the natural gas supply there having run short on several occasions recently.

Commission Denies Permission to Remove Pipes at Marshall, Ill.

The Illinois Public Utilities Commission has denied the petition of the Wabash Gas Co. to remove its gas pipes from the streets of Marshall, where natural gas service has had to be discontinued. The decision was not unanimous as two members, Messrs. Sterling and Lucey, filed a dissenting opinion. This settles the case, as there can be no appeal.

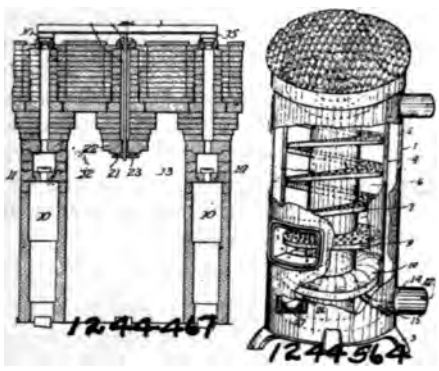
RECENT PATENTS

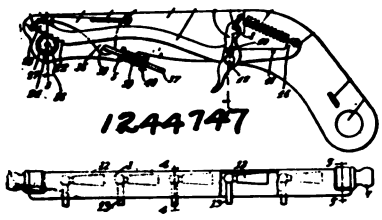
By R. S. McBride, U. S. Bureau of Standards

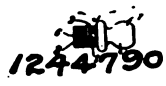
Patents Issued October 30, 1917.

1,244,467.* METHOD OF REPAIRING COKE OVEN WALLS. Albert H. Chalmers, Fairfield, Ala.—The method of repairing an injured or defective wall of a by-product coke oven having vertical openings through the roof leading to combustion chambers in the walls which consists in supporting a beam above the roof of the furnace and upon the two walls adjacent to the one to be repaired, suspending a supporting member through one of the aforesaid openings in the roof, supporting the roof from the lower end of said supporting member and then repairing the wall as required and removing said supporting member.

1,244,564.* GAS HEATER. John S.







Walker and Sylvester N. Wilcox, Pittsburgh.

1,244,747.* GAS LIGHTER. Charles F. Larsen, San Francisco, Calif.

1,244,790.* GANG VALVE LOCK FOR GAS RANGES, ETC. David N. Stevenson, Philadelphia.—A gang valve lock for gas ranges and the like, embodying a tubular member having an open end and a longitudinal slot and adapted to be moved longitudinally onto a series of valve handles, and a retaining plug insertible into the open end of said member.

1,244,840.* EXTRACTION OF HYDROCARBON PRODUCTS FROM SHALES AND COALS. David T. Day, Washington, D. C., assignor to Verner Z. Reed, Denver.—The process of treating shales or coals to extract volatile matters present in such shales or coals which consists in subjecting such shale or coal in one chamber to destructive distillation, condensing the vapors so generated in a mass of similar shale or coal in a second chamber to dissolve material from said shale or coal, and separating the combined condensed vapor and material dissolved thereby from the particles of shale or coal.

Patents on subjects of interest in the gas industry were granted on the dates indicated. The page in the Official Gazette of the United States Patent Office of these dates is shown in parenthesis for each patent. Numbers marked thus (*) are illustrated. Printed copies of patents are furnished at 5 cents each by Commissioner of Patents, Washington, D. C.

1,244,863. BLAST HEATER. William Wallace Kemp and W. H. Van Horn, Baltimore.—In combination, a member having an endless substantially closed passage from which air is excluded and provided with an opening for exhaust purposes only, and means for discharging a flame forwardly into said passage at a pressure greater than that of the atmosphere for reheating and causing circulation of the products of combustion therein.

1,244,864.* METHOD OF HEATING. William Wallace Kemp and William H. Van Horn, Baltimore.

1,244,903.* PROCESS OF EXTRACTING AMMONIA FROM AMMONIACAL LIQUOR. Nicholas Schuster, London, England, assignor to British Coke Ovens, Ltd., London.—A process for recovering ammonia from ammoniacal liquor obtained during the purification of coal gas and the like, consisting in passing said liquor through a still, leading off gas from the gas main, heating said gas in a superheater to a temperature between 212° F. and 750° F., forcing the heated gas through the still for stripping the ammonia from the liquor, returning the ammonia-laden gas to the gas main, and passing it together with the bulk of the gas to a saturater, substantially as and for the purpose set forth.

Patents Issued November 6, 1917.

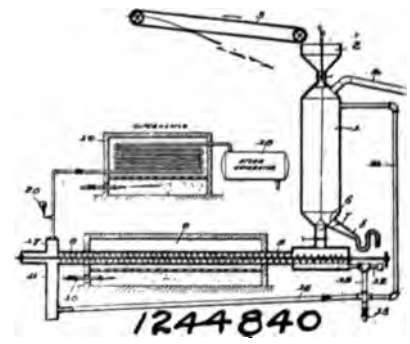
1,245,318. COMBINATION RANGE. Christopher F. Coda, Detroit, assignor to Art Stove Co.. Detroit.

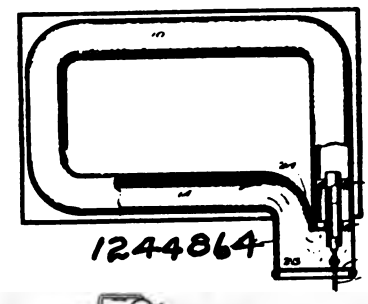
1,245,319. COMBINED RANGE AND GAS STOVE. Christopher F. Coda, Detroit, assignor to Art Stove Co., Detroit.

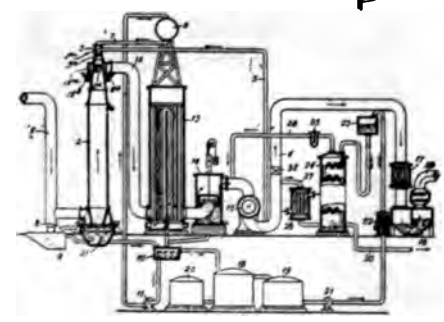
1,245,346.* GAS BURNER. Alfred H. Humphrey, New York City.—A gas burner comprising a metal burner tube rectangular at the tip and having vertical uniformly spaced slits in opposite walls thereof, and metal bars of uniform cross section disposed in said slits and united to the walls to provide heat conducting unions therewith, the spaces between the bars constituting unobstructed slot-like jet apertures of substantially uniform cross section from end to end, the thickness of the bars being substantially that of the jet apertures, the depth of the bars being approximately four times that of the jet apertures.

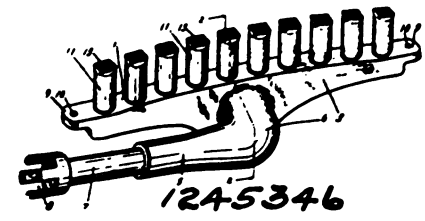
1,245,347.* GAS BURNER. Alfred H. Humphrey, New York City.

1,245,366.* DRAIN FOR GAS CLEANERS AND METHOD OF OPERATING THE SAME. Walther Mathesius, Chicago.—A method of preventing the lodgment of sediment at the outlet from the water seal of a gas washer, which consists in discharging the bulk of the water through a large overflow pipe connected to a restricted lower portion of the seal, and constantly discharging a relatively small quantity









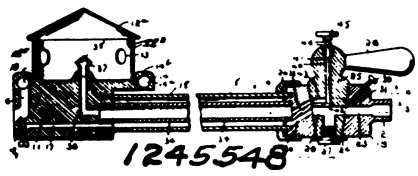
of water from the same point in the seal in a direction opposite to the flow of the bulk of the water, substantially as described.

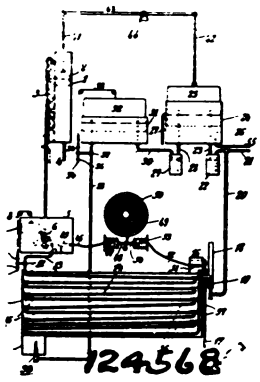
1,245,408. TOP PLATE FOR GAS STOVES. Henry Vonieff, Baltimore.

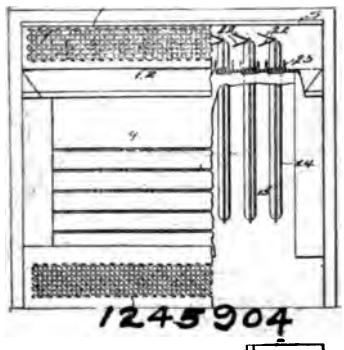
1,245,548*. LIGHTING DEVICE FOR GAS STOVES. Sidney H. Alexander, Englewood, N. J.

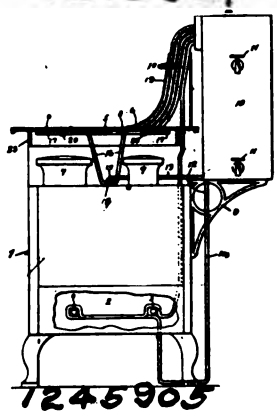
1,245,688.* METHOD OF AND APPARATUS

FOR TESTING GASES. George G. Crewson, Tottenville, N. Y., assignor to the Roessler & Hasslacher Chemical Co., New York City.—A method for continuously testing the heating value of gas.









1,245,904.* GAS HEATER. Louis T. Hagan, Winchester.

1,245,905.* WATER HEATING ATTACHMENT. Wesley Mack Hamilton, Tampa, Fla.

Emil H. Finke, former manager of the Mansfield (O.) office of the Medina Gas & Fuel Co., won a captaincy at the Fort Benjamin Harrison officers' training school.

Rochester, N. Y., Sells 7,725,000 Cu. Ft. of Gas in One Day.

Assistant General Manager Herman Russell, of the Rochester (N. Y.) Railway & Light Co. reports that in a record sale of gas on Monday, December 17, the total of 7,725,000 cu. ft. was consumed or 1,700,000 cu. ft. more than the same day a year ago. Of this amount about 700,000 is to be credited to the normal increase of the business and new business, but there is a clean boost of a million cubic feet on top of that, showing that a great many people were employing gas for heating purposes.

East Ohio Gas Co. Doubles Capital Stock; Retires Bonds.

The East Ohio Gas Co. of Cleveland recently more than doubled its capital stock, increasing from $20,000,000 to $45,000,000. The preferred stock remains at $10,000,000, according to President M. B. Daly, while the common stock is being increased from $10,000,000 to $35,000,000. Mr. Daly says that only $18,000,000 of the additional $25,000,000 is being issued for the purpose of retiring bonds.

Middle West Utilities Co. Declare Cash Dividend.

Middle West Utilities Co. has declared a dividend of 50 cents in cash on common stock, payable January 2 to stock of record December 15.

RITCHIE IS MANAGER.

J. A. Freeman Appointed Assistant for Shenandoah and Other Iowa Utilities.

R. J. Ritchie, who for the last nine years has been manager of the Peoples Gas Co. of Shenandoah, Ia., recently was made general manager of that company and the Shenandoah Artificial Ice, Power, Heat & Light Co. J. A. Freeman, formerly of Villisca, Ia., has been chosen assistant manager of these two successful utilities. These two companies beside supplying Shenandoah with gas also supplies electric energy to Shenandoah, Essex, Coin, Farragut and Imogene, Ia., as well as operating Hamburg and Riverton, Ia. They also have an up-to-date artificial ice plant, and supply steam heating to the major portion of Shenandoah proper. Among other extensive improvements being made are twenty miles of transmission line from Clarinda to Shenandoah. This is of the most substantial construction, all of the poles being of reinforced concrete and weighing about 4,000 lbs. each. The conductors are to be of stranded aluminum.

A. S. Witmer, who has been connected with the commercial department of the Louisville (Ky.) Gas & Electric Co. for six years, becomes commercial manager, succeeding Robert Montgomery, who has entered government military service.

PERSONAL ITEMS FROM THE GAS FIELD.

A collision between automobiles at Hammond, Ind., recently resulted in the serious injury of Ezra Geist, father of C. H. Geist, the Philadelphia gas magnate.

Richard J. Ambler, youngest son of T M. Ambler, commercial manager of the Brooklyn Union Gas Co., has received a commission as second lieutenant at Plattsburg Training Camp and reported at Camp Mead December 15.

Vice-President and General Manager James T. Hutchings, of the Rochester (N. Y.) Railway & Light Co., has been appointed by the government to expedite the production of supplies at Rochester, and in other ways to actively co-operate with the War Department.

Geo. W. Dresser, formerly manager at Goshen, Ind., has taken charge of the Hillsdale (Mich.) City Gas Co. for B. O. Tippy, general manager and engineer for the W. E. Moss syndicate of Detroit. Mr. Dresser takes with him Clyde Copenhaver, who was foreman at Goshen and will serve in a like capacity at Hillsdale.

J. Carlisle ("Red") Smith, famous third-baseman of the Boston "Braves," has gone to work for the Atlanta (Ga.) Gas Light Co. in the auditing department. He has been with the company before. "Red" was graduated from the company's championship team to the Southern League (Nashville) and thence to the National League.

W. W. Barnes and wife visited in Chicago a few days recently on their way back to New York from Tucson, Ariz., where Mr. Barnes spent three months for relief from throat trouble. The stay seemed to have restored him to his usual health and energy, and while zero weather was encountered at Chicago, both he and his wife were eager to get back home for the holidays.

Harry D. Wilson, manager of the Consumers' Gas Co., Waycross, Ga., and his wife were in Chicago last week on their way to Grand Rapids and Sagnaw for a holiday visit. Waycross now has over 700 meters in service with a daily send out of 50,000. Further, it is one of the few gas properties in the country that has been able to show on the right side of the ledger within the first year of its operations.

Natural Gas Measurement

Results of Tests on Orifice Meters and Pitot Tubes Presented at Pacific Gas Association Meeting by Midway Gas Co.'s Mechanical Engineer

By B. C. Williams

The developments in the measurements of natural gas in large quantities and under high pressure produce each year some new method or added improvement which increases our knowledge or simplifies the process. A method which has lately attracted the attention of many is that of measuring by means of an orifice meter. Measuring natural gas in this manner is comparatively new, yet many companies have adopted it and it has now been recognized as one of the standard methods, and the words "co-efficient" and "orifice meter extension table" are now a part of the gas man's vocabulary.

A Common Type of Orifice Meter.

In describing the operation of an orifice meter it is best to select one type and follow through the complete method. One kind of orifice meter in common use is made by inserting a calibrated disk between two flanges and using gauges to record the line pressure and the drop in pressure through the orifice. This entire orifice meter set-up has been made according to certain specifications established by tests. If these are closely adhered to in making up a meter it will conform to the standards already determined by many tests. Any variation from this method will not necessarily inaccurately measure the gas, but will make it necessary to apply conditions for that particular type of orifice.

This orifice is shown in Fig. 1. The disk is one-fourth inch thick and machined on both sides. The orifice is drilled straight for one-thirty-second of an inch and then beveled at 45 degrees. The beveled face of the disk is on the down stream side of the gas flow. The outside diameter of the disk is slightly less than the inside diameter of the bolt circle on the flanges. Two pins are set on the face of one flange near the inner edge of the bolt circle, these protrude about one-fourth inch. The disk rests on these pins instead of on the bolts and is thereby kept centered with the pipe. The gaskets between the disk and the flanges should not extend inside the pipe. One flange is tapped and a pair of set screws inserted. These are used in spreading the joints when it is desired to change the disk.

On the high pressure, or inlet side of the orifice, the connection for the off-take pressure is made two and one-half diameters of the pipe from the disk. On the lower side this off-take is eight diameters from the disk. For these pressure off-takes a clean-cut one-fourth-inch hole should be drilled and any burr on the inside of the pipe removed.

Computing Flow of Gas.

The quantity of gas which passes an orifice meter is computed in the following manner. The formula is:

$$Q = CV\text{horsepower}.$$

Where

Q=cubic feet of gas per hour at 60 degrees temperature and at the pressure base determined by C.

C=the hourly co-efficient. This is given in Table No. 1. It must be corrected for specific gravity and flowing temperature as will be shown hereafter.

h=drop in pressure through the orifice measured in inches of water.

P=absolute pressure in pounds per square inch of the flowing gas on the high side of the orifice. (This is gauge pressure plus barometric pressure). This assumes that gas compresses according to Boyle's law.

The co-efficients for orifice disks of various sizes have been computed and are given in Table 1. (Computed from date given by Francis P. Fisher and published in Journal of the American Society of Mechanical Engineers, September, 1916.) These are for air at 60 degrees flowing temperature, 60 degrees storage temperature and for a pressure base of 14.4, 14.65 and 14.9 pounds per square inch. It may be noted that 14.65 pounds pressure is 14.4 pounds plus .25 pounds, or 4-ounce pressure, and 14.9 pounds is 14.65 pounds plus .25 pounds. Hence the co-efficient in the column for the 14.65 pounds pressure may be used either for an atmospheric pressure of 14.65 pounds or for 14.4 pounds plus 4-ounce pressure, and those in the

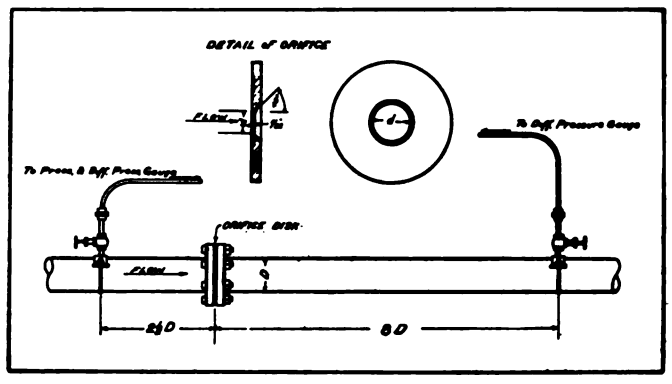


Fig. 1.

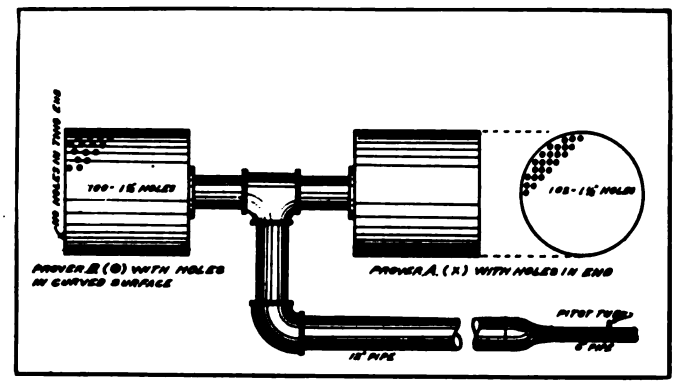


Fig. 2.

column for 14.9 pounds may be used for a barometric pressure of 14.9 pounds or for a barometric pressure of 14.65 plus 4-ounce pressure. This table gives the co-efficients for orifices in 4, 6 and 8-inch pipes. These are computed for the exact internal diameter of standard line pipe.

In order to apply the co-efficient given in Table 1 to gas of a specific gravity different from that of air, and which may be flowing at other than 60 degrees temperature, it is necessary that the co-efficient be corrected to the specific gravity and the flowing temperature of the gas. These two corrections are combined into one and are given in Table 2. To make this correction, multiply the co-efficient by the figure given in Table 2 which corresponds to both the specific gravity and the flowing temperature of the gas.

The value for V horsepower is given in orifice meter extension tables which are on the market.

In short, to apply this method take from Table 1 the air co-efficient given for the size of orifice in use and for the pressure base desired. Multiply this by the correction factor from Table 2 for the temperature and specific gravity of the gas, and multiply this by the value of V horsepower. The result will be the number of cubic feet of gas per hour reduced to 60 degrees temperature and the pressure base of the co-efficient used.

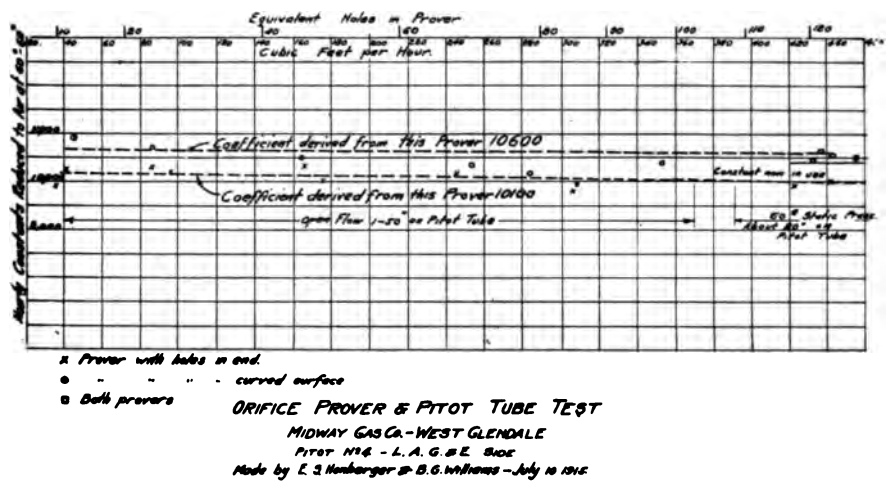


Fig. 3.

Tests on Accuracy.

Much interesting data is obtainable as to the accuracy of these meters. In a case where one was used, during operation, as a check upon another over a period of several months, the variation from day to day was small. The daily figures are here given for one month:

Date 1917.	Orifice No. 3.	Orifice No. 4.
July 1	10.478	10,223
July 2	10,076	10,133
July 3	10,941	11,016
July 4	9,200	8,834
July 5	9,925	9,951
July 6	10,698	10,689
July 7	9,642	9,716
July 8	10,339	10,219
July 9	10,814	10,805
July 10	10,458	10,542
July 11	10,595	10,684
July 12	10,663	10,813
July 13	9,913	10,111
July 14	10,972	11,064
July 15	10,024	10,006
July 16	10,369	10,484
July 17	10,464	10,583
July 18	10,487	10,616
July 19	10,223	10,453
July 20	9,861	9,999
July 21	9,746	9,795
July 22	10,505	10,489
July 23	10,140	10,163
July 24	10,371	10,426
July 25	10,395	10,461
July 26	10,785	10,889
July 27	10,483	10,526
July 28	10,262	10,321
July 29	9,389	9,375
July 30	9,805	9,926
July 31	10,450	10,827
	318,473	319,939

We have made a large number of tests with these orifices against holders, one of which I will mention as being of special interest. In this test the gas first passed through three positive meters of leather diaphragm type running in parallel at about 20 pounds pressure and 40 degrees temperature, then passed through the orifice and into the holder. The test was made after midnight so that the change in temperature was slight. All measurements were reduced to the same temperature and pressure base. Both the orifice meter and the position meters checked closer than within 2 per cent. of the holder.

The orifice meter whether of this or some other design, if properly operated can be depended upon to measure the gas with a very reasonable degree of accuracy. Pitot tubes and Venturi meters also are very reliable.

A few years ago before definite standards of this or any other type of orifice meter were established, each engineer built either orifice meters or Pitot tubes according to his own taste. The co-efficients of those were determined by means of an orifice prover and were correct in proportion to the accuracy of the prover. Owing to insufficient pressure it is difficult to check an orifice prover directly against a holder by attaching it to the outlet of the holder. Therefore the method used was to calibrate an orifice meter or Pitot tube by means of an orifice prover then insert one of these in the line leading into the holder and check against the holder. This was done where a line carrying several pounds

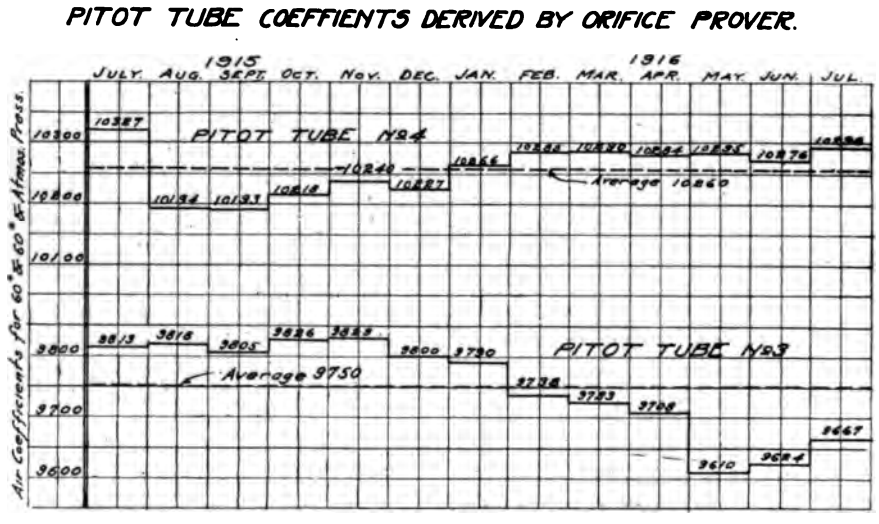


Fig. 4.

pressure could be connected to the inlet of the holder. By this method one could not only determine the accuracy of the orifice meter or Pitot tube, but would also get the degree of accuracy of the orifice prover used in the calibration.

Pitot Tube Test.

In one case, two Pitot tubes which were calibrated by means of an orifice prover and installed so they could be operated either in parallel or in series were used to check two orifice provers. These orifice provers differed in design, but both were supposed to be correct. Each had about 100 holes of one and one-half-inch diameter. In one prover these holes were in the end being reamed in the flat surface. In the other, the end was blank and the holes were reamed in the curved surface. These covered the entire curved surface except the bottom. The orifice provers were attached as shown in Fig. 2. When one was in service the rubber stoppers were used to blank off the other. A valve was placed between the Pitot tubes and the provers in order that the tubes could be tested under pressure. The value of the co-efficient derived by each prover for one of the tubes is given in Fig. 3. In this illustration the top row of figures 10-20-40, etc., show the amount of gas this number of holes would deliver per hour at one cubic foot per hole per second. This is the usual rate of flow of an orifice prover when used in testing, and is given merely as a comparison.

The cubic feet per hour passed for each test is plotted as abscissae. The value of the co-efficient, or constant, as we used to call it, is plotted as ordinates. The circles show the tests run by one prover, the x's designate the other, and the square is used for both provers. These marks are shown for each prover in Fig. 3.

The co-efficient derived from one prover was 10,600 and from the other 10,100. This clearly shows a variation of 5 per cent. between the provers. The tests for the quantities under 370,000 cubic feet per hour were made with the valves between the Pitot tubes and the provers open. Those from 390,000 cubic feet per hour and up were made by choking this valve and holding 60 pounds on the Pitot tubes. In this case the valve on the field side of the Pitot tubes was opened. This shows that the co-efficient for 60 pounds is about the same as for atmospheric pressure.

Pitot Tube Co-efficients.

The Pitot tubes above referred to were tested with these provers once a week for a period of more than two years and the co-efficients established by these tests during one year are given in Fig. 4. This was done by representatives of two companies. The variation is very slight, usually less than 1 per cent. from the average. This is easily within the limits of the error in reading the instruments. During the first part of 1916 the co-efficient for Pitot tube No. 3 began to decrease slightly. This is probably due to wearing on the pressure openings, any change whatever in these openings will alter the co-efficients.

That the early data checks with the newer methods now used is shown when two orifices of the type heretofore mentioned were installed in actual service and one of the Pitot tubes mentioned above was kept in a bypass to use as a check. A weekly check of these orifices against this Pitot tube has been made and is here given for one month:

Date.	Pitot Tubes Used As Standards.	Orifice No. 3 Cubic Feet Hour.	Orifice No. 3 Per Cent. Error.	Orifice No. 4 Cubic Feet Hour.	Orifice No. 4 Per Cent. Error.
May 2, 1917	338,000	340,200	0.6+	332,800	0.8—
May 7, 1917	392,200	387,000	1.5—	382,100	2.7—
May 15, 1917	327,200	327,100	0	320,800	2.0—
May 21, 1917	351,000	353,100	.5+	346,000	1.5—

The co-efficient used on this Pitot tube for these tests was derived by taking the average co-efficient found with prover designated by circles over a period of six months. The co-efficient for the orifice meters was derived in the manner shown above.

Not Suited for Irregular Flow.

When the quantity of gas to be measured is small, say below 10,000 cubic feet per hour, and the flow is irregular, it makes operation of the orifice meter very difficult. In this case a positive meter is frequently used with good results. The entire amount of gas passes through the diaphragm on these meters and is measured. In this they differ from the proportional meter which measured but a small percentage of the gas. There are two types of these meters in common use in this state, one has a metallic diaphragm and an oil seal to prevent gas escaping around the diaphragm. The other has a leather bellows diaphragm. These positive meters give very satisfactory results up to the limit of their capacity. The amount of gas one of these meters will accurately register under pressure and the effect that the specific gravity of the gas has upon it has been rather uncertain as few tests have been made to determine this.

The capacity given for the metallic diaphragm meter is for gas of .600 specific gravity and atmospheric pressure. A heavier gas or this same gas under pressure, causes a greater differential pressure than the lighter gas, as the same volume passes through the valves, and therefore breaks the oil seal at a less number of cubic feet per hour passed. As a large number of these meters were used under pressure

TABLE 1.

Hourly Air Coefficients for Orifice Meter at 60°

Diam. of Orifice in Inches	4" Meter 14.4"	4" Meter 14.65"	4" Meter 14.9"	6" Meter 14.4"	6" Meter 14.65"	6" Meter 14.9"	8" Meter 14.4"	8" Meter 14.65"	8" Meter 14.9"
0.500	53.0	52.1	51.3	52.0	51.9	51.1			
0.625	83.2	81.0	80.5	82.6	81.8	80.0			
0.750	120.3	118.3	116.5	119.2	117.2	115.4			
0.875	165.1	162.4	159.7	163.7	160.0	157.5			
1.000	217.0	214.1	210.8	213.3	209.7	206.5	211.9	208.2	203.0
1.125	275.5	271.0	269.5	271.1	266.5	262.4	268.5	264.0	259.5
1.250	340.9	334.1	327.6	336.3	330.0	325.5	332.5	327.1	322.0
1.375	412.0	404.0	396.1	409.0	402.1	396.0	357.5	351.5	346.0
1.500	490.0	500.3	501.5	490.1	482.0	474.3	402.3	474.8	466.7
1.625	581.0	610.1	600.6	572.0	563.0	556.0	552.5	549.3	546.0
1.750	706.0	723.0	712.0	676.5	665.4	654.8	660.7	649.3	639.3
1.875	868.0	853.2	840.0	784.0	770.0	752.2	768.0	749.2	737.4
2.000	1004.	999.3	983.5	900.1	885.1	871.2	871.1	856.5	842.2
2.125	1186.	1166.	1148.	1087.	1010.	994.0	980.0	971.5	956.0
2.250	1377.	1364.	1333.	1165.	1146.	1128.	1115.	1096.	1079.
2.375	1597.	1571.	1545.	1316.	1295.	1274.	1250.	1220.	1210.
2.500	1846.	1805.	1766.	1475.	1450.	1427.	1383.	1370.	1348.
2.625	2073.	2031.	2007.	1660.	1615.	1706.	1710.	1681.	1655.
3.000	2870.	2844.	2169.	2220.	2241.	2207.	2076.	2036.	2004.
3.375				2804.	2758.	2713.	2479.	2437.	2398.
3.500				3468.	3351.	3299.	2943.	2893.	2849.
3.750				4132.	4063.	4000.	3466.	3408.	3356.
4.000				5025.	4981.	4844.	4052.	3985.	3923.
4.250							4740.	4660.	4590.
4.500							5592.	5490.	5312.
4.750							6370.	6265.	6168.
5.000							7342.	7220.	7110.
5.250							8490.	8348.	8220.
5.500							9820.	9659.	9508.

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ranging from two to twenty-five pounds it was thought advisable to run tests under various pressures and determine a load curve for them.

The testing apparatus consisted of two orifice meters and an orifice prover all arranged in line so that the measurement was checked by each. It was also arranged so that three meters could be set in this same line and all could be tested at once. This allowed the work to be carried on rapidly and also quickly showed up an error in any of the instruments. It also required but one-third the amount of gas or air that would have been necessary had they been tested one at a time.

These tests were run with air under two or three pounds pressure as was necessary to pass it through the set-up and for twenty-five pounnds. These were also run with gas at corresponding pressures and also an intermediate test at nine pounds. We wished to know if this variation in capacity was in proportion to the weight of the gas passed.

A sample sheet of one of these capacity tests is given in Fig. 5. The volume in cubic feet per hour is plotted as abscissae and the percentage efficiency as the ordinates. The curves show that for gas at .720 specific gravity the meter registered about 101 per cent. efficiency, or 1 per cent. fast up to its capacity and that it could not be forced to register more than this amount. As more gas than this was passed through it broke the seal and came up through the oil.

For air at practically the same pressure the amount registered was about 6,380 cubic feet per hour. This is due to the fact that air is heavier than gas.

The capacities to which this size of meter would register at various pressures for both air and gas are given in Fig. 6. This shows that the capacity is greater for gas of .720 specific gravity than for air.

At about six pounds pressure a cubic foot of this gas weighs the same as a cubic foot of air at atmospheric pressure and the curve for gas shows practically the same capacity at six pounds as for air at atmospheric pressure. Simliarly at fifteen pounds air pressure it takes about twenty-seven pounds pressure on the gas to make a cubic foot of it weigh as much as a cubic foot of air weighs under fifteen pounds pressure, and the capacity for these pressures checks closely. While the amount of gas that the meter dial will register under pressure is less than that at atmospheric pressure, the actual amount passed when reduced to atmospheric pressure is greater, since the amount that it will register for any pressure multiplied by the pressure multiplier always gives an amount greater than the capacity at atmospheric pressure.

The curves in Fig. 6 are plotted from a number of tests such as are shown in Fig. 5. Similar tests were made on a 3,000 cubic foot capacity meter. This gave a capacity of a little more than 3,500 cubic feet per hour for gas at 0 pressure and the pressure curve would correspond proportionally with the gas curve given in Fig. 6.

Leather Diaphragm.

The work done to determine the capacity for various pressures on the leather bellows diaphragm meters was more limited. These tests were made wtih natural gas of .910 specific gravity and for a pressure of one pound and 30 pounds. Three meters were run in parallel, or in a battery as some call it, and the gas passed into one header and all was measured by two orifice meters in series. The amount registered by each of the meters was practically the same which showed that they were checking very closely. The result of these tests is given in Fig. 7. The meters each registered a little more than their rated capacity under one pound pressure. When more gas than this was passed through they ran slow. At thirty pounds they would register correctly about 1,300 cubic feet per hour. This reduced to atmospheric pressure will be 3,900 cubic feet per hour, which is more than the rated capacity at atmospheric pressure.

A possible reason for these meters running slow when forced beyond capacity is that the extra force of gas tends to lift the valves from the seats and thus allow the gas to pass. The moral in both cases is "Do not operate the meters beyond the rated capacity."

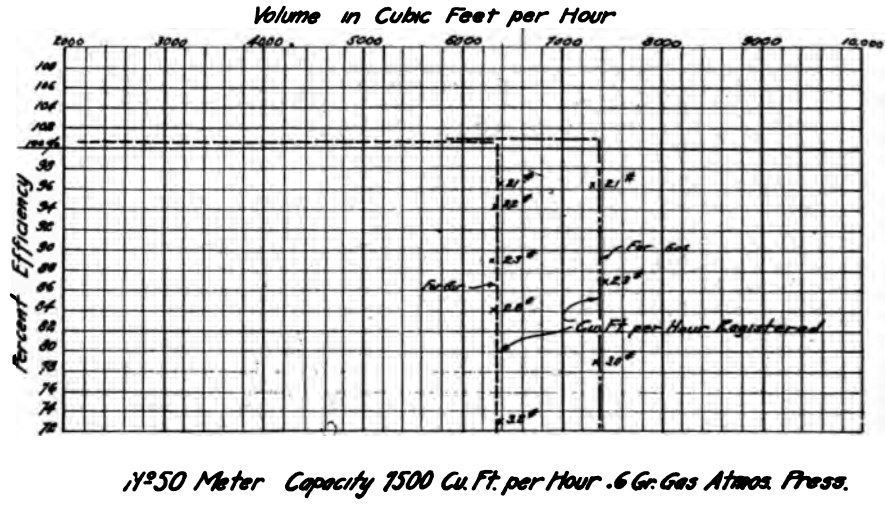


Fig. 5.

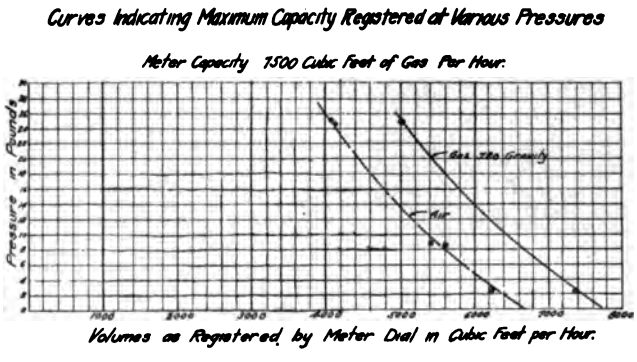


Fig. 6.

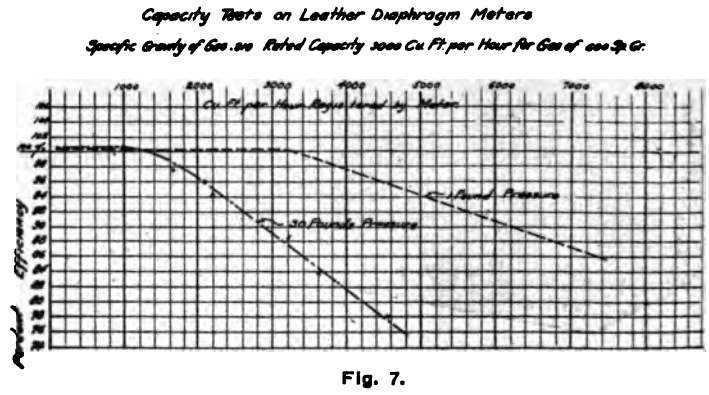


Fig. 7.

Ash Content High

Analyses of Coal Samples Show Excessive Amount Says Director

There is one phase of the present coal situation which may put an entirely different light on the supposed increased production of coal of the present year, declared Van. H. Manning, director of the Bureau of Mines, recently in discussing the general need of fuel conservation in the boiler rooms. In round numbers, there was produced 600,000,000 tons of fuel last year. Statement has been made that 50,000,000 more tons will be mined this year. The preparation of this increased quantity of coal has not been as good as in times past. Analyses of samples show in many cases a greatly increased quantity of ash. Repeated cases are brought to the attention of the Bureau of Mines where coal which would run from six to eight per cent. ash in normal times is running from 12 to 18 per cent, of ash in these abnormal times. Complaint about the preparation of coal is very general and it is not at all improbable that 5 per cent. more ash is included in this year's coal than in previous years. If such a figure is true, it means that 32,500,000 tons of the estimated output of 650,000,000 tons is nothing but increased ash. If we can imagine over 600,000 carloads of ash being added to the present burden of transportation, the evident effect on car supply and transportation troubles would be seen.

If this were the end of the matter, it would not be so bad, but there is another factor well known to engineers which is apt to be overlooked by the non-technical user. The extensive experiments carried on by the government at the St. Louis exposition showed that with the coals used, there was a decrease of about 1½ per cent. in efficiency for each one per cent. addition to the ash content of the coal—that is to say, the inclusion of more ash with the coal decreases the value of the fuel not only the amount equal to the useless ash, but it makes the remaining good coal less effective to the extent of 1½ per cent. for each one per cent. of ash. The inclusion of five per cent. more ash in the fuel, therefore, means a reduction in efficiency of the remaining good coal of about 7½ per cent., which, added to the five per cent. useless ash, makes a total reduction in effectiveness of 12½ per cent.

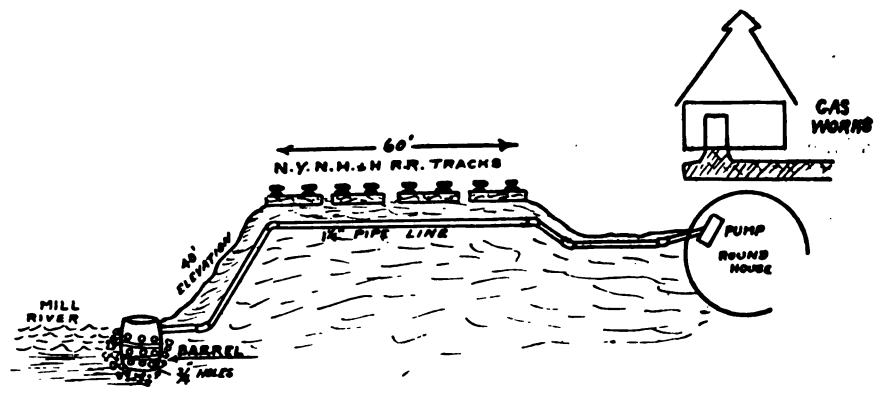
According to this point of view, although 650,000,000 tons may be produced in 1917, its effectiveness as compared with previous years is probably about ⅞ of this, and equivalent to a production of normally prepared coal of about 570,000,000 tons. We have, then, instead of an increased production as compared with last year, an actual decrease of effective coal of about 30,000,000 tons. If this is added to the estimated increased needs, due to our accelerated activities, of 100,000,000 tons, we have a deficiency of the equivalent tons to make up by good engineering and true fuel conservation in the boiler of 130,000,000 tons instead of 50,000,000 room.

REDUCES WATER COST

Simple Arrangement in Massachusetts Plant Reduces Water Bill 75 Percent.

The Northampton (Mass.) Gas Light Co. has found a way in which it can reduce the city water consumption at its works at least seventy-five per cent., says a recent issue of "Service Talks," published by the Gas & Electric Improvement Co., Boston. A large amount of water is used each month at the works for quenching the coke, filling empty tar barrels; sealing, etc. The works being situated within a hundred feet of Mill river, it was deemed feasible to pump water from this river for these purposes.

To lay the pipe line to the river it was necessary to waterbore under four railroad tracks a distance of sixty feet; the road bed being of gravel this was easily accomplished. At the edge of the river bank a barrel with ¾ inch holes on all sides was sunk to the level of the river; this will be used for storage while the pump is in action. Stones were placed within a radius of ten feet around the barrel which will prevent sediment from reaching the pipe and the pump. The water is taken from the river by a pump at the works which is used also for pumping tar. With steam up, a steady supply of water can be pumped from the river where the water is as free as air.



Showing Arrangement of Pump Line at Northampton, Mass.

TOLUOL RECOVERY.

Basis on Which Government Is Contracting with Gas Companies for This By-Product.

Regarding the government's proposals to gas companies concerning the recovery of toluol and amortization of investment in toluol plants, the following unofficial statement is made from Washington:

"The government is contracting with a number of large gas companies where it will build the additional plant needed and will arrange with the gas company to operate the plant at cost. The cost, however, is intended to cover every item entering, chargeable directly or indirectly to the operations and even makes allowance for rental for the companies' property that is utilized in whole or in part and allows a charge for all general services contributed. In these cases the government owns the recovery equipment and no amortization provision is necessary. In other cases the government is contracting for the whole output of toluol from the gas companies at $1.50 per gallon. It is intended that this figure will permit the gas companies which have invested intelligently in toluol recovery equipment to amortize a large portion if not the whole investment before the end of the period for which the government is contracting. Every effort is being made to give the gas company a square deal in this matter."

THE COAL SHORTAGE.

President of Consolidation Coal Co. Says Railroads Are To Blame for Present Crisis.

In a recent letter to the "Baltimore Sun," President J. H. Wheelwright of the Consolidation Coal Co., says:

"As it would seem that the government of the United States is about to take charge of the direction of the transportation companies, is it not timely to bring to your attention the fact that these transportation companies must be ordered and these orders must be universally carried out, to furnish to the coal mines of the United States sufficient railroad cars to take care of the fuel needed? My personal belief is that, if this is done, we have sufficient man power at the mines to produce the necessary coal. If, however, the coal operators and the coal miners fail in their manifest duty to produce the necessary fuel, then give the president of the United States the power to conscript the operators, the coal miners and take over the coal mines and compel the operators and the coal miners to perform their duty with the same fidelity as is required of the soldier in the trenches, who is facing the most powerful and cruel foe that the world has ever known."

Commenting on Mr. Wheelwright's letter, the "Sun" says, editorially:

"Where the blame for the situation lies no one without full knowledge of the facts can say. It may lie with the railroads, or with the fuel administration, or with the priority officials. If the railroads are carrying other classes of freight which yield them larger profits in preference to coal; if, as Judge McChord charges, the element of self-interest in the railroad operators prevents efficiency, then the fault is with the railroads. If the fuel administration has diverted the coal from essential to non-essential industries, the fault is with it. If the priority officials have given less necessary commodities preference over coal, then the fault is theirs. No one unacquainted with the full facts can know. But official Washington can know, and it should act accordingly. * * * Until we get the coal situation straight, everything else must remain crooked. * * * The new executive who will be placed in charge of the railroads when the government takes control ought to realize this truth and keep it ever in his mind."

Port Huron, Mich., Sells Coke by Cubic Foot.

To avoid complaints on short weight in coke, Port Huron (Mich.) Gas Co. officials have decided to sell by cubic foot instead of ton weight. It is claimed the coke absorbs moisture and when dried out weighs 200 pounds less to the ton.

BENZOL RECOVERY.

Groeling and Gasser Processes of Light Oil Described by French Engineer.

The Groeling and Gasser processes for benzol recovery were described by M. Leonce Fabre, of the Marseilles gas works, in a recent issue of the "Revue Générale Chemic," an abstract of the article appearing in the Chemical Trade Journal.

The Groeling Process.

In the Groeling process the gas is first cooled; and the benzol is then absorbed, extracted, washed, and rectified. Absorption is effected by means of four columns provided with the necessary pumps, tanks and pulverizers. The saturated oil is conveyed to a tank placed above the stills, into which it is introduced after having passed through a reheater which utilizes the heat of the vaporized benzol. This distillation apparatus is heated by means of steam coils. The benzol vapors pass through a dephlegmator; and the temperature is kept up so that the vapors pass into the cooler and are condensed. The benzol-free oil, after distillation, is cooled down to 20° C., and is again used in the columns. The crude benzol is collected in a tank which feeds a series of washers. There are two such feeding tanks; four tanks for the acid, one empty; two for the caustic soda; and two cylinders for the water, together with the necessary fittings.

The continuous washing process is as follows: The benzol from the tanks passes into the first feeding tank or vat, passes over a layer of acid and into the second vat, and thence into the empty vat, where it is left to stand for a time in order that any acid carried along may separate out. The benzol then passes into the soda tank, and finally into the water tanks. This method has the advantage that it requires no stirring; and consequently there is no loss of benzol by evaporation. Moreover, the space required, also the labor, are much less than when stirrers are used.

In small plants the rectifying apparatus consists merely of a still with a coil inside for direct or indirect heating; a dephlegmator, with steam heating in the lower part; and two condensers in the upper part. Suitable valves are provided for removing the various distillation products at the different levels. The 90 per cent. benzol, 50 per cent. benzol, and naphtha are obtained by means of three different dephlegmators. Groeling's method is thus continuous, and is said to be very economical in regard to plant and labor.

The Gasser Process.

It is, of course, well known that a washing-oil saturated with benzol requires less heat for setting free the benzol than an oil which contains less benzol. It is, therefore, desirable to obtain a temperature which increases in proportion as the benzol content decreases. Moreover, distillation is more complete if the oil is heated in thin layers. It is on this principle that the Gasser process works. The saturated oil first enters into a tubular heat exchanger, and is heated by the benzol vapors and steam coming from the stills. The oil then passes into a second heater, which acts at the same time as a hydraulic seal or closure for the still, and in which heat exchange is effected by the hot benzol-free oil coming from the stills. The oil then passes into a third reheater, consisting of cylindrical elements provided with superheated steam coils, and passes thence into the distilling apparatus. This consists of a number of cylindrical elements furnished with steam coils and jets. The coils maintain the necessary temperature, and the jets remove the benzol. After leaving the stills, the oil passes through the reheater above described, and after cooling it is conveyed to the column. On the other hand, the mixture of steam and about 50 per cent. of the benzol are conveyed from the still into a dephlegmator, the surface of which consists of cylindrical cells; and thence into a second dephlegmator consisting of three tubes filled with coke to absorb the last traces of oil. The mixture next goes into the oil reheater and finally into a cooler where it is cooled down to 20 to 25°. The water and benzol are then separated in the usual way. Several advantages are claimed for this method—e. g., the small space required and the easy accessibility of the plant.

TO USE WASTE GAS.

Can Mine Gas in Anthracite Fields Be Utilized for Homes and Factories?

A conference to discuss the possibility of harnessing the thousands of tons of gas daily wasted throughout the anthracite region will be called shortly by the Scranton (Pa.) Board of Trade. Joseph J. Walsh, mine inspector at Nanticoke, recently made measurements in his district and found 154,577 tons of pure gas are sent into the air annually. Engineers say that this gas, known as methane or marsh gas, is combustible when mixed with nine parts of air. In other words, the 154,577 tons of gas in the Nanticoke district can be turned into 1,545,770 tons of combustible fuel. This is more than sufficient to get up all the steam and heat needed around the mines and collieries and the balance could be sent out to homes and factories in pipe lines.

Concrete Gas Main

British Company Introduces Experiment in Gas Distribution

An interesting British development in reinforced concrete—its application for gas main construction—is described in Concrete and Constructional Engineering, an English publication. The high cost of steel and cast iron mains, the article states, which hitherto have been exclusively used for the transmission of gas, has rendered it advisable (and even imperative) to have recourse to other materials and methods of construction. Reinforced concrete, having been largely used for water mains, naturally presented itself as a possible substitute. Up till now—although gas engineers and specialists in reinforced concrete work have frequently admitted the possibility of using reinforced concrete pipes for the distribution of gas—they have been reluctant to commit themselves to the experiment. The principal difficulties which had to be overcome were the porosity of the concrete, and the difficulty of finding a suitable gas tight joint. It is therefore to the credit of Messrs. Edmond Coignet, Ltd., the well known reinforced concrete specialists, and to their clients, the Barnsley Smokeless Fuel Co., Ltd., that they have acted as pioneers in this matter; the former company having designed, while the Barnsley company have constructed, the first reinforced concrete gas main in this country at the latter's new works at Barugh, Yorkshire. The gas mains were designed and constructed in accordance with the general indications and requirements of Stephen Wellington, consulting engineer of the new works; and it is mainly due to his enterprise that reinforced concrete was adopted.

The first question that presented itself

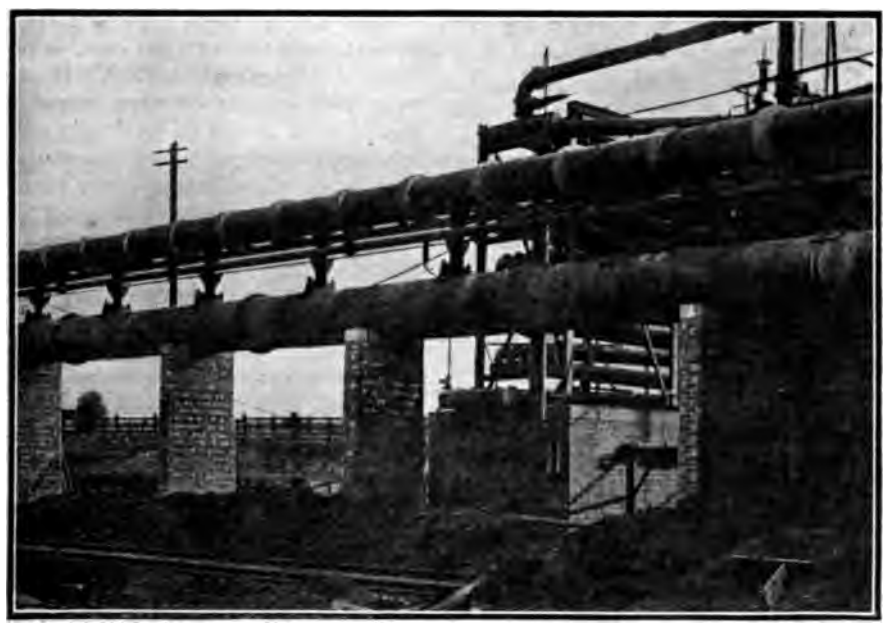
14-In. Concrete Gas Main.

was whether it would be preferable to make the pipes on the site of the works or in some particular spot away from the works, whence they would ultimately have to be transported. On careful consideration, it proved more convenient to deliver all the materials and the molds for making the pipes on the actual site of the works, where there was plenty of space available—more especially as the difficulties of transport were considerable. After investigation, it was found that the most suitable length to make the pipes for this purpose was 6 ft.; their diameters being respectively 14 in. internal and 24 in. external diameter. The smaller pipes have a thickness of only 1¾ in., and the larger ones of 2 in.; and they are reinforced by means of a mesh-work of expanded metal. Special steel collapsible molds were devised for the purpose of making the pipes on the site; and this method has turned out both rapid and practical. The collars for the joints between consecutive pipes were also made in reinforced concrete in a similar manner to the pipes, and in small molds made for the purpose.

Women Employed for Work.

Practically, the whole of the operations of concreting these pipes has been carried out by women. The concrete was suitably graded, and of a proper mixture to ensure both strength and density; and the pipes were very carefully made, in order to prevent all possibility of air bubbles or cavities. After they were cast and matured, they were plunged in a bath of tar of a sufficient temperature to make it thoroughly liquid; so that the pipes should be permeated in every pore by this substance. This extra precaution was for the purpose of filling up any small cavity or pinhole which might have remained undetected. The pipes were then laid in the trench in the same manner as cast iron mains; and their ends were jointed by means first of a special joint of tow treated with pitch and cement.

Obviously, the success of making and laying pipes of this description requires that particular attention should be given to a number of important details, both in the construction and in the laying and jointing of the pipes.



Reinforced Concrete Gas Mains in British Plant.

Pittsfield (Mass.) Gas Association Holds Meeting.

An even half hundred members of he Gas Company Employees' Association, Pittsfield, Mass., met at its hall recently, where pleasure and business were combined on a program that was regarded as one of the most successful the local gas association has as yet carried out. Jesse R. Stetser, assisted by H. B. Palmer, from the Welsbach Co. factory at Gloucester, N. J., gave an illustrated talk on a trip through the big new million dollar plant of this company.

Conserve the Coal

Mechanical Stokers and Forced Draft Effective Fuel Savers

Americans have been as wasteful of coal as of other resources, largely because coal has been abundant. To many consumers it has seemed hardly worth while to give time and thought to the saving of coal, so declared Van H. Manning, director of the Bureau of Mines, in a recent interview.

Conditions have suddenly changed. Today it is everybody's business to save coal. Coal is the foundation stone of industry. Without it the production of equipment for war must halt. Transportation facilities must stand still. One man's careless and wasteful use may mean an idle factory or a cold house for his neighbor. With the world looking to us largely for its coal supply, with increased demands at home, with a scarcity of available labor, with overtaxed transportation facilities, the consumer of coal must pause and give serious consideration to the problem which confronts the country.

If the consumers can be aroused to an intelligent consideration of the burning of coal, they can begin to save 10 per cent. of the production (600,000,000) at once. With more effort, through instruction and a moderate remodeling of coal burning equipment, which could all be accomplished during the war, a further considerable saving can be made. The possible coal saving, when present practice is compared with the best ideal practice, is very large. If it were possible to supply the need of this country for light, heat and power through the highest type of mechanical devices, and if we could make a skilled coal user out of the average user, we could probably get along with half as much coal as we are now consuming. This ideal is far beyond present realization.

The immediate problem is a difficult one. We cannot scrap all out-of-date power plants. We must start by doing the best with what we have. We must begin saving coal at once. The problem is personal. It deals with the human element. We must reach the man with the shovel.

Firemen Must Conserve Coal.

About fifteen million people shovel the 20 per cent. of our coal used for domestic purposes. Only about two hundred and fifty thousand firemen shovel the 60 odd per cent .of our coal used by power plants and railroads. While we must appeal to the householder to save coal, it is vastly more important to reach the fireman through whose hands the larger part of our coal passes.

The householder must realize that when he throws a shovelful of anthracite coal into his furnace its value is equivalent to half a pound of sugar, or half a loaf of bread, or a pint of milk. He must appreciate that it is worth while to examine his house and to overhaul his heating equipment. Weather strips, double windows, pipe coverings, clean flues and chimneys, and tight fittings in ash-pit, dampers and furnace parts will all pay. Damper control is one of the chief secrets of economical heating. Clean surfaces are most essential, as soot is a poorer conductor of heat than asbestos. Care, attention and taking pains will be the greatest factors in saving domestic coal.

The fireman is, however, the biggest single factor to be considered in a campaign to secure the largest saving of coal. Many manufacturers have made a serious mistake in failing to consider the fireman as a skilled worker. Too often he is treated as a roustabout. He is not well instructed, nor given proper labor-saving devices. As coal increases in price, or becomes difficult to get, the fireman handles more and more of his employer's money. His efficiency means more in dollars and cents. This is an encouraging feature in the situation. It means a better recognition of the importance of the fireman, more efficient work on his part, and a consequent increased saving of coal. The viewpoint is changing. It is no longer cheaper to pay for the coal than to educate the fireman.

In carrying out a campaign to promote the saving of coal, let the appeal be made to the householder to cut down his consumption in every way possible, but above all, give serious consideration to methods by which a systematic relationship may be established between the office and the fireman. Encourage the manufacturer to take a keener interest in his fuel consumption and to back up his fireman by giving him the best information and equipment available. This problem has two phases—first, to arouse the interest of the manufacturer and his engineer and fireman and to point out the part which they can play in relieving the present crisis in coal supply. Second, to furnish whatever technical information may be desirable and which will be immediately applicable to accomplish the result sought."

In connection with Mr. Manning's remarks the following extract from an article by Newton Harrison, E. E., in the November issue of "Central Station," is of interest:

Advantages of Mechanical Stokers.

Perhaps one general advantage of mechanical stokers will be admitted without a word, and that is the fact that heat is saved by their use, due to the doors of the furnace being kept closed. Another feature of prime importance is the evenness of the firing. The coal is laid on in such a way that the best possible results arise from it. In other words, it is better burned than it would be if irregularly arranged. Consequently, the mechanical stoker not only cuts down the labor of handling the fires to a minimum, but it deals directly with coal or heat saving. Mechanical stokers seem expensive at first sight, but when man labor and its cost are considered, it is obvious that the stoker pays for itself very rapidly. It pays first of all in labor saved. It pays, secondly, in the saving of coal and heat. It is claimed that a much more smokeless fire results from this system as well. Certain forms of stokers not only feed fuel, but air as well. To supply the correct quota of air along with the coal is an interesting feature. The method is extremely scientific and practical. But the chief point is that coal is actually saved by this systematic form of supply. Heat is saved by keeping the furnace doors closed. The use of an air supply independent of the chimney draft is another point adding to the general economy. The air and the coal are the forms of potential energy the central station consumes.

Forced Draft.

According to some experts a saving in fuel from 10 to 20 per cent. is possible with mechanical draft. If it is very cold outside or very warm the forced draft is able to meet either case without difficulty. The column of air that is circulated, only when that in the chimney reaches a certain temperature, is artificially produced by the forced draft. The introduction of this forced draft, with the very hot gases, aids the general chimney temperature. By means of this system the use of economizers is made more efficient. A hot blast of gases irregularly passing is not as effective as that of an even flow of normal temperature air and gas mixed, less air in total is actually consumed. The coal, therefore, is able to add to its usefulness in this additional arm of the boiler. The claim, that from 10 to 20 per cent. of fuel is saved in this way, has substantial grounds for belief

Blue Water Gas

Production in Small Plants for Mixing With Present Coal Gas

The writer is fully convinced of the advantages of the admixture of blue water gas with coal gas, and many managers now experiencing a largely increased demand for gas, coupled with a shortage of coal and labor, may be glad to know of some arrangement which could be easily installed, which would enable them to produce more gas without increasing their purchases of coal, and which would at the same time enable them to effect a considerable saving in the cost of manufacture, declares W. H. Townsend recently in the London Gas World.

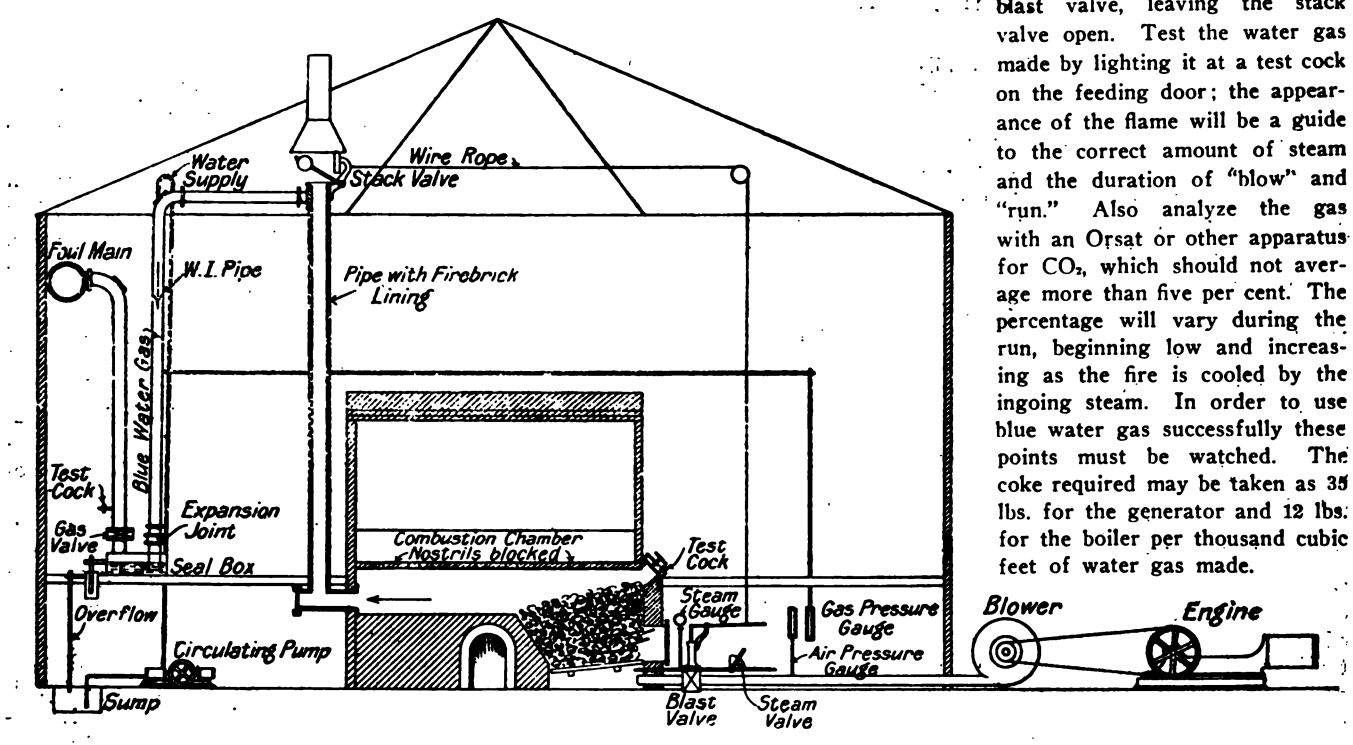
It has occurred to the writer that an ordinary generator retort furnace could be utilized in the following way, or if no spare furnace was available one could easily be constructed from materials usually at hand on a gas works. The nostril holes in the furnace arch would have to be securely blocked up, and a new furnace feeding door and frame, with machined joint and screw, fitted. Probably it would not be difficult to pick up a blower or fan, and a steam or gas engine to drive it, and this could be coupled to the furnace below the grate bars by means of a pipe fitted with a suitable double-faced valve. An outlet pipe of wrought iron or steel lined with firebrick would be built in to the end wall of the generator, below the arch, to convey the blast products to the stack valve and the water gas to the seal box. From the latter a pipe would convey the water gas to the foul main. A steam supply to the generator below the fire bars fitted with a regulating quadrant cock and pressure gauge would also be required.

The stack valve would be worked by a wire rope from the front of the furnace, where the operator would stand to work the steam supply and the blast valve also. It would be a simple matter to couple the stack valve to the blast valve by means of the wire rope so that it would not be possible to open the blast valve with the stack valve closed, and by another simple arrangement the opening of the steam valve would be prevented unless the blast valve were properly closed. An old exhauster would serve as a blower, but in that case a relief valve should be fitted, because during the run the blower would be working with the blast valve closed. In any case a high blast pressure (18 to 20 in.) is desirable, as it means economy in fuel, and a pressure gauge should be fitted on the blast pipe.

It would not be possible with the above arrangement to reverse the steam, but this would not matter much, as the clinkering operations in such a producer would be more easily carried out than in a water gas generator.

A test pipe should be fitted on the blast pipe in order to show, by smell, any leak of water gas past the valve, which must be kept perfectly gas-tight to avoid the risk of explosion in the blast main. It is needless to state that the producer, the producer door, the furnace arch, and all the connections, must be perfectly gas-tight, or poisonous gas will escape and perhaps cause accidents. The seal or washer should be arranged so as to give several inches of seal, and it would require a continuous supply of water to maintain the seal, for which purpose a pump to circulate the water over and over again would be required. The water should be introduced into the water gas outlet pipe as high up as possible so as to wash down any deposit in the pipe and to keep it cool. The seal box and all the gas pipes should be fitted with cleaning covers so that deposits could be easily removed, and the pipes should have expansion joints, as they will become very hot. No condenser or scrubber would be needed, as the water gas would be cooled and purified with the coal gas.

The plant should be worked all through the twenty-four hours so as to add a certain percentage of water gas regularly. The depth of fuel in the generator should not be less than 4 ft. 6 in., in order to ensure the manufacture of good water gas, and therefore fresh coke should be added through the feeding door at frequent intervals, hot coke from the retorts being used if possible. Before adding fuel or opening any door on the plant, stop gas making by shutting off the steam, and blow fire for a few seconds to clear the water gas out of the generator and mains. Then close the blast valve, leaving the stack valve open. Test the water gas made by lighting it at a test cock on the feeding door; the appearance of the flame will be a guide to the correct amount of steam and the duration of "blow" and "run." Also analyze the gas with an Orsat or other apparatus for CO_2, which should not average more than five per cent. The percentage will vary during the run, beginning low and increasing as the fire is cooled by the ingoing steam. In order to use blue water gas successfully these points must be watched. The coke required may be taken as 35 lbs. for the generator and 12 lbs. for the boiler per thousand cubic feet of water gas made.



Generator Retort Furnace Used for Manufacture of Blue Water Gas.

The proportion of water gas added should be gradually increased up to a maximum of about 33 per cent. of the coal gas (25 per cent. of the total volume of mixed gas). At the same time, if possible, increase the district pressure by about one inch (from 2½ in. to 3½ in., say), and adjust the air supply to all bunsen burners on cookers, fires, etc. Gas engines should be adjusted by opening the gas valves more, thereby increasing the gas and reducing the amount of air drawn into the cylinder, and thus correcting the mixture.

All this may seem very elementary to those who have experience of water gas plants; but this article is not intended for them, but for those managers of small and medium-sized works who have not, and cannot get, a properly designed plant, to whom it is hoped it may be of service.

The sketch shows a method of using a retort furnace, and readers will be able to vary this to suit their circumstances.

Cecil McGrilliard, of Muncie, Ind., is the new manager of the Cambridge City (Ind.) Natural Gas Co. Forest Scudder, whom he succeeds, has engaged in the automobile business.

WELDED JOINTS.

Series of Tests Made at University of Illinois Presented in New Bulletin Recently Issued.

A series of tests of the strength of oxyacetylene welded joints in mild steel plates have been completed by the engineering experiment station of the University of Illinois under the direction of H. F. Moore, research professor of engineering materials. Specimens were supplied by the Oxweld Acetylene Co. of Chicago and tests were made in the laboratories of the station at Urbana under three conditions of loading: (a) static load in tension (in a testing machine), (b) repeated load (bending), and (c) impact in tension (in a drop testing machine).

For joints made with no subsequent treatment after welding, the joint efficiency for static tension was found to be about 100 per cent. for plates one-half inch in thickness or less, and to decrease for thicker plates. For static tension tests, the efficiency of the material in the joints welded with no subsequent treatment was found to be not greater than 75 per cent. The joints were strengthened by working the metal after welding and were weakened by annealing at 800 degrees C. For static tests and for repeated stress tests, the joint efficiency sometimes reaches 100 per cent.; the efficiency of the material in the joint is always less. This indicates the necessity of building up the weld to a thickness greater than that of the plate. The impact tests show that oxyacetylene welded joints are decidedly weaker under shock than is the original material; for joints welded with no subsequent treatment, the strength under impact seems to be about half that of the material.

In general, the test results tend to increase confidence in the static strength and in the strength under repeated stress of carefully made oxyacetylene welded joints in mild steel plates. The results of these tests have been published as Bulletin 98 of the engineering experiment station, copies of which may be obtained without cost by addressing C. R. Richards, director, Urbana, Ill.

Paul C. More, Secy.-Treas., Southern Gas & Elect. Corp., New York, has resigned to become vice president of Allentown (Pa.) Trust Co.

Leet Gasoline Substitute

Southwestern Gas Man Has Newly Patented Method in Operation Which Is Reported To Be Producing Three Gallons per 1000 Cu. Ft. of Gas

A formula for combining heavy oils and greases with casinghead gas and making a gasoline substitute out of them has been devised by W. G. Leet, for several years connected with the Southwestern Gas and Electric Co. at Shreveport, La., who has applied for a patent and organized the Hydro-Carbon Co., which is operating a plant near Mooringsport in the Caddo oil field. Mr. Leet will make application for the $100,000 offered by the International Ass'n of Automobile Clubs for the invention of a substitute for gasoline, which can be produced at less cost than the real article, claiming that his formula produces an oil which is not only a substitute for gasoline but is better than the original, and which can be manufactured for little more than half the cost of manufacturing the lowest grade of gasoline on the market. Oils made by his process, he declares, can be produced at any specific gravity desired.

"My first idea," says Mr. Leet, "was to accomplish the reorganization of hydrocarbon structures in the same manner that many others working for the same end had employed with indifferent success—by the strenuous application of heat. But I found at once that while this method accomplished the 'cracking' of the heavy oils, it also drove off the light hydrocarbon gases and the success attained came through the elimination of excess carbon and the reorganization of the hydrocarbon structure of the heavy oils, the carbon remaining as lamp black or coke in the cracking chamber, the form of the deposit depending upon the degree of heat employed. There could be but one conclusion; that the heavy oils must be vaporized at a low temperature congenial to the retention of the extremely light hydrocarbon gases and this is what I have accomplished. According to patent attorneys I have retained what no one else has. I also discovered another factor of great value. By using a small quantity of vegetable or animal grease as dilutents, mixed with mineral oils, or by using vegetable or animal oils exclusively, the resultant light oil rendered is less dangerous to handle by reason of the fact that it has a smaller range of volatility, less vapor tension, a more favorable end point and more explosive power."

Get Three Gallons, Gasoline Substitute

Aside from the formula for the process, Mr. Leet has devised the machinery and equipment for manufacturing the substitute and the Hydro-Carbon Co., of which he is president, has the exclusive right to its manufacture. The plant near Mooringsport handles 500,000 feet of gas daily and is said to be producing the substitute at the rate of three gallons per 1,000 feet of gas. Others interested with Mr. Leet in the company are W. I. Woodruff, A. C. Jordan, J. A. Northcott, J. Rushing and Albert Rushing.

PROBLEMS IN THE GAS BUSINESS

Conducted by W. M. Henderson, Assistant Engineer Gas Department, Pacific Gas & Electric Co., San Francisco.

ANSWERS TO QUESTIONS.

239—Labor Installing Heaters.

How many men would it require to install a No. 4 automatic gas water heater and how long on average reheating job? How long on average direct job?

A man and helper ought to install a No. 4 automatic water heater in a day to a day and a half under ordinary conditions.—V. Starzenski.

246—Reinforced Concrete.

Will iron imbedded in concrete corrode?

It is a subject of much discussion whether or not the iron or steel that is imbedded in concrete will corrode. There are several factors that have a bearing on this question. In the first place, Portland cement when set contains considerable free calcium hydroxide which is produced during setting when the tribasic calcium silicate Ca_3SiO_5 and the dibasic Ca_2SiO_4 revert to the mono-form $CaSiO_3$. It has been found by experiment that a saturated solution of calcium hydroxide has a very protective value. In a concrete mixture such as should be used for reinforced work there is much more than enough free calcium hydroxide to produce this saturated solution. Although the calcium hydroxide in the exterior layers of the concrete structure soon becomes carbonated by the carbon dioxide in the air, the formation of the more dense calcium carbonate makes the concrete less porous and the further penetration of the carbon dioxide more difficult. Still it is very obvious that the metal should not be allowed to be too near the surface of the concrete.

Much can be done to insure the protection of the encased iron by properly proportioning the concrete so that it is as free from voids as possible, since these allow an easier penetration of the corroding agents. Also, round bars are better in this respect than square and twisted bars, since the chances for the formation of voids is less, and the concrete should be of a sufficiently wet mix for the same reason. It is said that the rod before being imbedded in the concrete need not be cleaned of rust, since the calcium hydroxide set free in the cement appears to dissolve the iron oxide with the formation of calcium ferrites or ferrates, leaving the metal bright. It should be noted that cinder concrete should never be used for reinforcing work, since it without fail causes corrosion.

It seems then reasonable to believe that if the reinforcing concrete is properly made, the reinforcing rods will not corrode. And, in general, this belief has been thus far confirmed by the facts. In concrete structures that have been torn down, after many years, the metal has been found clean and free from rust.

However, there are two factors that may accomplish the destruction of reinforced concrete structures. These are the presence of cracks and voids, and the action of electrolysis. If cracks and voids of sufficient magnitude exist, corrosion of the encased metal without doubt will occur. And since the bulk of the rust produced is much greater than that of the iron, the increase will widen the opening so that the final result will be disastrous. Also if conditions should happen to be such that electrolysis occurs about the encased bars, corrosion will certainly take place, for under these conditions iron corrodes even in the presence of the alkali. This is especially true of the rods or portions of rods that are in the anode position, that is, so placed that the current passes from them into the surrounding concrete.

This department will supply information on problems arising in every department of the gas industry. Your co-operation is solicited, both in asking and answering questions. Address: W. M. Henderson, Pacific Gas & Electric Co., 445 Sutter St., San Francisco, Calif.

NEW QUESTIONS.

257—Water-Proofing Concrete.

What is the common practice to make concrete water-proof or even damp-proof?

258—Oil Storage.

Would like to know if any one has ever used a gas holder tank as a storage reservoir for gas oil. Are there any losses due to evaporation? Do you add water in order to maintain level when oil is withdrawn? What other conditions do you have to contend with?

259—Concrete.

Does heat, cold, or salt water have a detrimental effect on concrete? Are there any other destructive agents to be looked for?

248—Cements.

Some place, some time I have seen a list of various cements for different purposes. Can you refer me to where I can get a copy of same?

Answer 1—From a recent issue of the General Chemical Bulletin the following is an extract:

"One of the principal precautions to be observed in the application of a cement is the condition of the material to be joined. All connections should be properly fitted together with flanges or exposed flat surfaces as nearly co-incident as possible. The cement should never be depended upon to do what the pipes or other portions of the apparatus should do. Its function is to cement or seal and nothing more. In most cases one part of the fitting should overlap the other so as to make a small amount of the cement effective. Cement for a joint of this type should be of a nature that may be quickly applied, that is effective while in place and easily removed when desired. An excess of cement should always be avoided to prevent shrinkage, cracks and leaks. The general methods of plastic cement application are varied to suit special cases as follows:

(a) Heating the composition to make it plastic until firmly fixed in place.

(b) Heat applied to the surface to be cemented.

(c) Application of the cement with water or a volatile solvent, depending upon the evaporation of the solvent for drying or setting.

(d) Moistening the surfaces to be cemented with water, oil, etc. (The vehicle of the cement itself.)

(e) Application of the cement in workable condition, setting taking place by (1) chemical reaction, (2) hydration, (3) oxidation.

The application of the following materials as plastic cements is noted: (1) Plaster of paris; (2) hydraulic cement; (3) clay; (4) lime; (5) asphalt or pitch; (6) resin; (7) rubber; (8) linseed oil; (9) casein and albumen; (10) silicate of soda and oxychloride cement; (11) flour and starch; (12) miscellaneous materials.

(1) Plaster of Paris—Plaster of paris is often used alone as a paste for joints on gas and wood distillation retorts and similar places where rapidity of setting is a requisite. In order to impart strength, a fibrous material such as asbestos is often mixed with it. Shavings, straw, hair and cloth are frequently used as binders, when a high temperature is not required, while stone, glass and various mineral substances are used as fillers. The following cements are particularly suitable for oil vapors and hydrocarbon gases: (a) Plaster and water. (b) Wet plaster and asbestos. (c) Wet plaster and straw. (d) Wet plaster and plush trimmings. (e) Wet plaster and hair. (f) Wet plaster and broken stone.

(2) Hydraulic Cement—Cement is used either alone or with sand, asbestos, etc., and is especially resistant to nitric

NEW PRODUCTS

Strength of Pipe Welds

Results of 160 Tests Made by E. A. Klages of University of Pittsburgh on Welds in Wrought Iron Pipe—Various Tests and Conclusions Drawn

By A. M. Byers Co.

Welded pipe made of wrought iron or steel is always subjected to a hydrostatic test before leaving the mill. The range of pressures applied in ordinary practice is from 250 pounds up to 2,000 pounds, the great majority of sizes of standard weight pipe being tested under a pressure of 750 to 1,000 pounds per square inch. As the hydrostatic test is an evenly applied bursting load of short duration, it does not insure against splitting of pipe at the weld under torsional, tearing or compression stresses which are encountered in the course of cutting, threading, bending and installing.

Fig. 1.—Finished Pipe Being Subjected to High Pressure Hydrostatic Test.

The strength or dependability of the weld in iron and steel pipe has, in fact, always been open to some question, as every pipe man knows from experience that new pipe shows a tendency to split under stresses apparently much below the hydrostatic test pressures. If the pipe is well made from a good grade of material the percentage of such failures should, however, become negligible, although not entirely avoidable.

In order to further minimize the percentage of weld failures, the A. M. Byers Co. subjects all crop ends of pipe to a crushing test. The greatest number of defects naturally will occur at the ends of the pipe and the crushing test is, therefore, a very effective test, leading to the immediate detection and rejection of a defective length of pipe. The machine used for this purpose is illustrated in Fig. 2.

A series of flattening tests on pipe, which had already been subjected to the mill tests referred to have been carried out by Edward A. Klages, of the University of Pittsburgh. One hundred and sixty pieces of pipe of various sizes, both buttweld and lapweld, were tested, and the pieces placed at varying angles to the vertically applied pressure, as illustrated in Fig. 3, which gives the results of the tests made on 2-inch lapwelded pipe, standard weight.

Analysis of all the tests is interesting as showing that of 160 pieces of buttweld and lapweld pipe tested, including all sizes from 1 to 12 inches of different weights, only 20 pieces, or 12½ per cent. showed commencement of failure at the weld. A summary of the failures follows:

It will be noted that 12 of the weld failures were in 24 pieces of 1-inch buttweld pipe, and only eight weld failures occurred in 136 pieces of lapweld pipe of all sizes. In spite of the excellent welding quality of genuine wrought iron, for which this material has always been favorably known, the results of the tests were a little surprising in that they showed in the main

Fig. 2.—Crushing Crop-Ends of Pipe to Make Sure of Strength of Weld.

SUMMARY OF TESTS.

	Pieces Tested.	Number Weld Failures.
1-inch regular buttweld	8	4
2-inch regular lapweld	8	0
4-inch regular lapweld	8	0
8-inch regular lapweld	8	0
12-inch regular lapweld	8	0
1-inch extra heavy buttweld	8	4
2-inch extra heavy lapweld	8	2
4-inch extra heavy lapweld	8	0
8-inch extra heavy lapweld	8	0
12-inch extra heavy lapweld	8	0
1-inch double extra heavy buttweld	8	4
2-inch double extra heavy lapweld	8	0
3-inch double extra heavy lapweld	8	0
4-inch double extra heavy lapweld	8	0
2-inch— 4 pound tubing—lap	8	2
2-inch— 4½ pound tubing—lap	8	0
3-inch— 8½ pound tubing—lap	8	0
3-inch—10 pound tubing—lap	8	1
4-inch—11 pound tubing—lap	8	0
4-inch—11¾ pound tubing—lap	8	3
	160	20

AMERICAN
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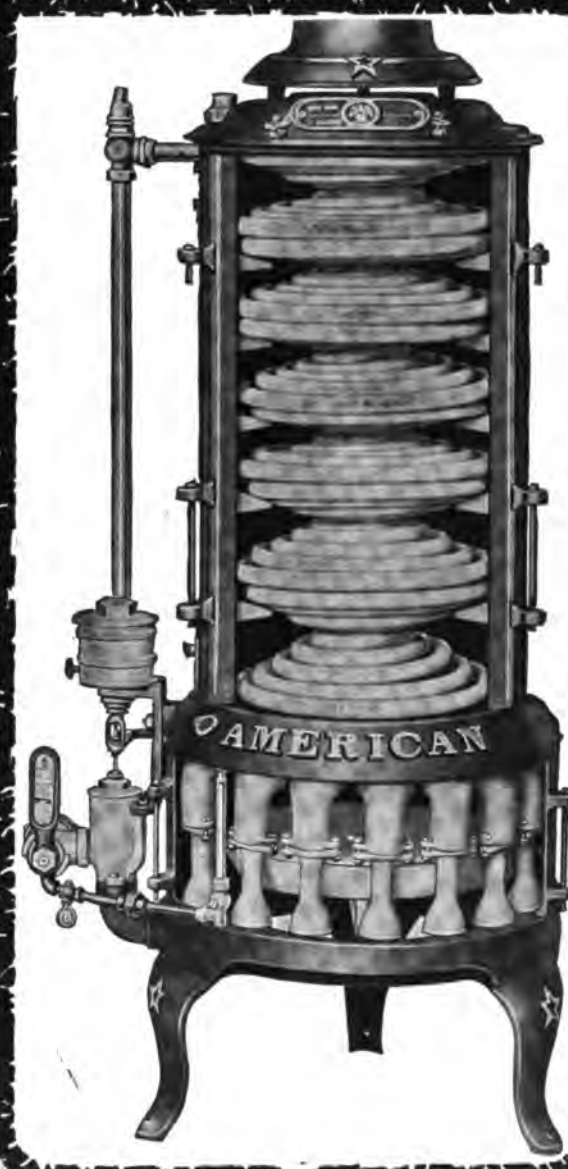


Reznor Pushes New Fireplace Heaters.

The new fireplace heater of the Reznor Mfg. Co. is selling rapidly, according to the reports from the makers at Mercer, Pa. The new appliances utilize the Reznor type of burner, of which the makers say: "It requires no repairs, adjustments or replacements, burns without a mixer and at all pressures, low or high, it maintains a complete combustion of the gas." In support of its contention that the Reznor type of appliance is excellent for new-business departments to handle, the Reznor Mfg. Co. quotes the following from a report of an N. C. G. A. committee on utilization of gas appliances:

"The result of our discussion on gas room heaters of the portable class is that it is to the interest of the gas industry to handle the yellow flame type, and to discourage the blue flame type, of heater; the former possesses all the advantages and none of the disadvantages of the latter; it produces no odor, it maintains always a complete combustion of the gas, and having no mixer as a part of its burner, it is free from the liability of lighting back. Your committee concludes that, in selecting gas fireplace heaters of the type that does not utilize a flue, it is to the best interest of gas companies to take those of the yellow flame type, of which, fortunately, there are attractive forms on the market." Full details of the entire line will be sent upon request.

Pressure and Velocity Measuring Instruments.

The Bacharach Industrial Instrument Co., Pittsburgh, is distributing an interesting bulletin on pressure recorders for measuring pressure and velocity measurements. They are built as indicating, recording and combined indicating and recording instruments.

New Maxon Premix Burner Catalog Issued.

The Maxon Premix Burner Co. has issued a new catalog that has many practical points to commend it to the industrial appliance salesman and buyer. The catalog gives complete data of the Premix burners, their fields, descriptions of models, installations and sheets for sketching suggested installations. A copy of this catalog will be sent upon request by the Maxon Premix Burner Co., Muncie, Ind.

Brenner Gas Co. & By-Products Corp'n. Organized at New York

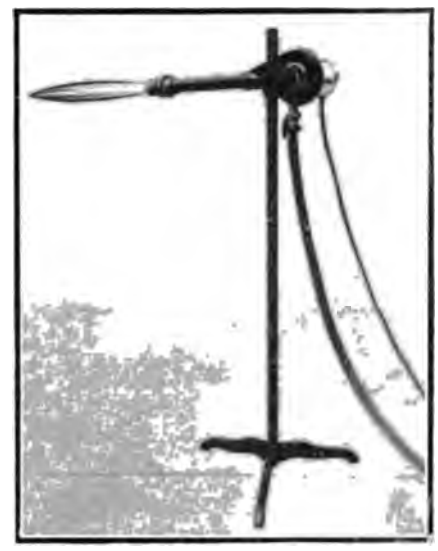
The Brenner Gas & Byproducts Corp., capital $100,000, has been incorporated at New York City to engage as electrical and mechanical engineers. Incorporators: Samuel B. Howard, George V. Reilly, and Arthur W. Britton, 65 Cedar st.

The Michigan Stove Co., Detroit, has announced a new net price list, 1711A, applying to the Garland gas appliance catalog 1711, effective December 7, 1917.

Develops New Blow Torch of Novel Design.

A unique blow torch, operating with either natural or manufactured gas and designed to produce high temperatures by employing a pressure fan integral with the torch to mix the gas and air for combustion, now is being marketed by the Naab Manufacturing Co, Cleveland.

Essentially the apparatus consists of a portable gas torch which is entirely self-contained. The pressure fan is attached directly to the burner, thus eliminating air leakage and loss in transmission. The function of the fan is to mix thoroughly the gas and air in a proportion such as to stimulate perfect combustion before forcing the mixture to the burner. In the burner additional provisions are made to admit



New Blow Torch for Gas.

secondary air to still further stimulate combustion.

Adjustment of the flame can be made such that any length of flame from three inches to 24 inches can be produced and any temperature attained up to 2500 deg. Fahr., it is pointed out. When operating at maximum capacity, the gas consumption is 180 cu. ft. per hour, while the current consumption during the same period of time is 80 watts or 0.08 kilowatts per hour. A motor of the universal type is fitted so that the torch may be operated on either direct or alternating current. A supporting standard also is provided on which the torch can be locked at any height or angle. The outfit complete weighs 23 pounds.

This machine, it is stated, is especially useful when used for heating small hardening furnaces, melting furnaces, also as a preheater for acetylene welding and general shop use for babbitting, bending, forging, brazing, shrinking, etc.

Complete details will be furnished by the manufacturers on request.

The Pittsburg Water Heater Co. Pittsburgh, Pa., announces the appointment of Joseph G. Perkins as sales manager for the Toledo, O., district, with show room at 703 Jefferson Ave.

Nye Loses His Bet With Us About Christmas.

To have one of Harry Gale Nye's Christmas greeting letters pop in with the mail is a pleasure that, unfortunately, comes but once a year. Nye has the happy faculty of brightening his letters, and it was with eagerness that we tore open the envelope and read the following:

My boy once offered to bet me a nickel he would not get a dollar on Christmas. I won the bet.

I bet you a nickel you have a rotten Christmas, and I hope you will blow twenty dollars on yourself, if necessary to make me lose. I'm game.

If you blow it on the kiddies, I know I will lose.

I also want to wish you a Happy New Year.

May you have to fire seven collectors and hire eleven cashiers.

May you get every job you figure on, and some you don't.

May your business show a profit, *but not show it too much.*

May you do a whale of a business, and find plenty of oil in the whale, and may we both be on the job to wish each other a Merry Christmas and a Happy New Year, as long as there are Happy New Years in which to have Merry Christmases.

That's what I wish.

Sincerely yours,
H. G. Nye.

Mrs. Rose Now With McJunkin Gas Ad Service.

Mrs. F. H. Rose, for four years connected with the Mobile Gas Co. in the capacity of advertising manager now is associated with the McJunkin Advertising Co. in public service publicity work. While in Mobile Mrs. Rose was responsible for many striking window displays that were reproduced in THE GAS RECORD, among them a Yellowstone geyser window advertising the Pittsburg water heater. She also was the author and illustrator of two series of street car cards which were written in rhyme. This publicity excited so much sales interest that it has been suggested for use by other gas companies in their street car space.

Mrs. Rose will be represented by copy contributed to the gas company co-operative publicity service conducted by the McJunkin Advertising Co.

The employes of The Gas Light Co., of Augusta, Ga., were given a ten per cent. increase by L. Irving Pollitt, president of the company, on a recent visit to that city. Mr. Pollitt explained that while none of the employes had asked for an increase he was well aware that living expenses had increased and that the increase was given to show that the company appreciate the stick-to-it-iveness of its employes.

Herbert R. Straight, vice-president and manager of oil operations of the Empire Gas & Fuel Co., contributes an informing article in the December issue of Doherty News on methods used by his company in drilling in the mid-continental field.

COURTS-COMMISSIONS

Seek Maximum Efficiency for California Companies During War.

Commissioner Thelen of the California railroad commission has begun an investigation of the gas industries of California with a view of ascertaining ways and means of decreasing expenditures incidental to operation and at the same time increasing the effectiveness and usefulness of such companies to the state and federal government during the war.

Conditions Under Which Properties May be Discontinued.

In the case of the Batesville Gas Co., the Indiana commission rules that a natural gas utility having a diminishing supply should be authorized to abandon service where it has suffered substantial losses during the years of its operations, and it would require a prohibitive rate to pay a fair return on the property investment and allow for depreciation, operation and maintenance expenses, it appearing that the utility had offered to sell its plant to the municipality, and had surrendered its municipal franchise, and had manifested its willingness to surrender its charter to the state. It also was stipulated by the commission that a natural gas utility, upon being authorized to abandon service and remove its mains and pipes, should be required to replace the highways and streets in as good condition as they were before the removal of the mains and pipes.

Natural Gas Co. Allowed Value of Its Existing Artificial Plant.

In the case brought by the City of Whittier vs. the Southern Counties Gas Co. of California, the commission holds that in establishing values for a gas system distributing natural gas, the generators and accessories constructed and operated in good faith though not used at the present time, but which it is necessary to retain as an insurance of service, will be allowed. Also it is held that when a utility voluntarily puts into effect a lower schedule of rates in several communities than it establishes in another community, the commission can only assume that it is earning a fair return on the lower schedule voluntarily established or that it is willing to operate at a lower rate of return in other municipalities than it desires the commission to establish in the municipality where its rates are under investigation. The rates in the city of Whittier are held to be discriminatory and the following revised schedule established: Domestic service, first 2,000 cubic feet, $1.10 per 1,000, ranging to 30 cents per 1,000 cubic feet for amounts over 50,000 cubic feet per meter per month: minimum bill $1.00 per meter per month.

Sawdust and Shavings Not Legal Tender in Maryland.

That sawdust and shavings are not legal tender in Maryland is the substance of an opinion that was handed down recently by the public service commission of Maryland by William Cabell Bruce, its general counsel. The opinion is based on a question presented by F. W. Woodcock, superintendent of the Eastern Shore Gas and Electric Co. Mr. Woodcock wanted to know whether the company in supplying electric current to a planing mill could accept sawdust and shavings in payment. Mr. Bruce holds that the acceptance of payment in merchandise would constitute a discrimination in rates and that this is not permitted under the public service act.

Utilizing Revenue from Bond Sales —Changing Accounting System.

In the case of the Kings County Lighting Co., the first district New York commission ruled that the commission had power to require as a condition to authorizing the issue of bonds that the utility use such portion of the proceeds thereof as necessary to make good the amount of expenditures charged to its depreciation reserve. It also was ruled that a public service commission, without taking an independent proceeding against a utility, in which it is given notice and an opportunity to defend itself, has no power to acquire, as a condition to authorizing the issue of bonds, that the utility change its system of accounting and put its depreciation charge upon some other basis than that adopted by it, where it was entitled under the law to fix its own rule or rate of depreciation.

Basis for Fixing Equitable Rates for Service.

In the case of the California-Oregon Power Co. the Oregon commission said: "The ideal condition which should exist between a utility and consumer can be attained only with the furnishing of adequate service by the former at reasonable rates, and conversely, the payment of a fair price by the latter for that which he demands of the utility. Equity entitles the utility to a fair return on money invested honestly if it may be obtained without the assessment of unreasonable charges upon the consumer. The rate under which the consumer receives maximum advantages should, if it provides a proper return to the investor, ultimately prove the most beneficial to all parties concerned; and in this connection it is believed that the commission should provide such rates as will permit and encourage the maximum use of the utility service and at the same time produce a fair rate of return on the necessary investment involved. The limiting conditions in this theory are that the rates to produce a fair return must not be above the value of the service rendered nor below the actual additional cost thereof, and that there shall be no unjust discrimination between individuals, classes of consumers or communities. An unfortunate fact often disclosed by close analysis of conditions surrounding a particular case is that rates designed to provide a fair rate of return on an investment, honestly and fairly made, will be too high to promote a free use of the utility product, and consequently will have a tendency to defeat the primary purpose of the charges. Such conditions arise naturally throughout the early development period of some undertakings and throughout the entire lives of others which are built upon unsound foundations, or which have suffered from commercial reverses of the territory in which they operate. One basic element to be considered in rate design is that the service may be of greater value to one class of consumers than to others. This feature must be given particular attention in the determination of schedules to produce equitable and satisfactory results. Except in cases involving developments for special purposes, it is not believed a violent assumption that, in the natural constructive process, the most attractive business, to which service is of greatest value per unit, will be sought first, and particular stress laid upon its development. In the average case, this may also be the primary factor which induces the undertaking. With the high-class business attached to the system at rates reasonable in comparison with the value of the service given therefor, additional service may be extended to other use at lower rates—necessarily less on account of the lower value of the service—which may approach, but should in no case go below, the actual additional cost of providing that service. The acquisition of such business; especially if it be served by facilities already used for other purposes and at a time when such facilities are idle, may be accomplished at rates considerably above the additional cost incurred, and under such conditions will tend to decrease the average unit cost of energy to all classes previously served. Low-value business thus becomes an attractive asset, and its promotion, under these conditions, a benefit to all consumers. This appears to us to be a fundamental principle in the development of utility business and one which, if neglected, may retard the progress of any enterprise."

"Going Value" in California—Minimum Charge Allowed.

In the case of the City of Los Angeles vs. the Southern California Gas Co. the railroad commission of that state ruled: 1. That the commission will not, in a case in which it has not the power to establish a standard of gas, fix rates on gas of higher heating quality than the company is serving.

2. That the doctrine of supersession does not apply so as to require the elimination of the generating plant of a gas company from the valuation of its property for rate making, on the ground that it is no longer needed, where it appears that the company generated and distributed artificial gas

Welded Joints Mean Leak-Proof Pipes in Modern Buildings

THE Prest-O-Lite Welding Process is now widely used in constructing piping systems for steam, gas or air—in factories, office buildings, hotels, stores, apartment houses, power and refrigerating plants, etc., also on thousands of out-door pipe lines.

Joints welded by this process are far superior to standard threaded couplings. Welding not only makes the joints absolutely leak-proof—strong as the pipe itself—but also effects remarkable savings in the cost of installation.

On many simple piping systems welding has cut the cost 25%. Where special threaded fittings would ordinarily be used, welding has made even greater savings. Welded joints take up less space and are neater—pipe covering can be applied more easily and at less cost.

Investigate Prest-O-Lite welding as a means to greater efficiency and positive economy in the construction of piping systems of all kinds. Special literature sent to those interested.

Prest-O-Lite PROCESS

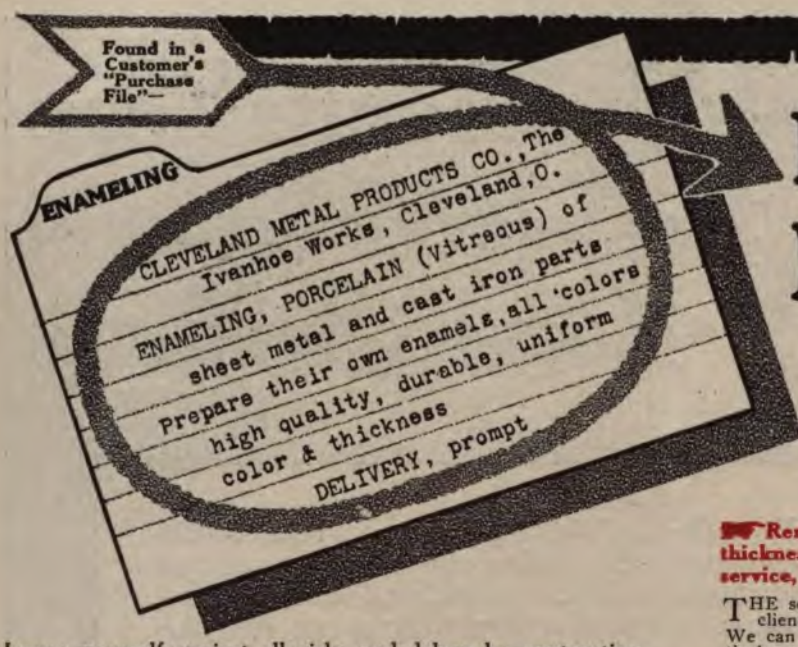
In the manufacture of thousands of American metal products—from locomotives down to dental appliances—the Prest-O-Lite Welding Process is introducing many striking economies and new methods. It is reducing the use of the bolt, rivet and threaded joint—making possible stronger, neater and better products at ***lower cost.***

For making quick repairs to broken machinery parts and defective castings this process is used by thousands of factories, railroads, mines, shipyards, munition plants, machine shops, garages, etc.—saving millions of dollars by eliminating costly delays and replacements of damaged equipment.

Welding is saving other millions by reclaiming and putting back in service enormous quantities of valuable material that have been thrown aside as worthless.

Write us for illustrated literature showing many examples of savings and advantages obtained by welding—in manufacturing, construction and repair work of all kinds.

The Prest-O-Lite Co., Inc.
U. S. Main Office and Factory
826 SPEEDWAY INDIANAPOLIS
Canadian General Office and Factory
Dept. A, 2 TORONTO, CANADA
59 Branches and Charging Plants
World's Largest Makers of Dissolved Acetylene



Porcelain Enameling

Flintlike and durable, the beautiful finish produced by our perfected Vitreous-enameling process is a mark of quality and long service.

This process is especially adapted to the enameling of Stove Parts, Gas Lamps and Reflectors. Our enamels are prepared in our own laboratories.

Remember these five big points—uniform color, uniform thickness, all-quality enamel (greater durability), speedy service, and prompt delivery. Tell us your needs.

THE services of our entire enameling plant are at the disposal of our clients—as if it were a "next door" part of their own organizations. We can produce special colors and grades of enamel to fit your particular uses. As well as enameling, our service includes the making of parts when desired.

Insure yourself against all risks and delays by contracting with us for your 1918 enameling needs.

THE CLEVELAND METAL PRODUCTS CO

IVANHOE WORKS···CLEVELAND OHIO

Extra heavy buying of benzol has resulted in greatly reducing the large stocks which had accumulated. Other coal-tar products are fairly quiet.

Demand for cast iron pipe has shown great improvement. The government has distributed orders for some 2,900 tons of cast iron pipe for military use in France. Numerous municipal and corporation tonnages are being estimated. The Philadelphia Co., of Pittsburgh, is expected to close this week for 375 miles of lap weld pipe totaling 20,000 tons of 2 to 16-inch sizes and for iron pipe aggregating about 9,000 tons from 1½ to 10¼ inches.

No improvement has been shown in the coke situation where there is extreme shortage of cars and congestion of traffic. A saving factor in the central territory has been the big coking plant of the Laclede Gas Light Co., St. Louis, which has been producing at full capacity, and has been using its metallurgical surplus to supply acute needs in surrounding territory.

Pig Iron

Bessemer valley	$36.30
Bessemer, Pittsburgh	37.25
Basic, Pittsburgh	33.95
Basic, eastern Pennsylvania	33.00
Basic, Buffalo	33.00
Malleable, Pittsburgh	34.45
Malleable, Chicago	33.50
Malleable, Philadelphia	$37.00 to 37.50
Malleable, Buffalo	33.50

Coke

(At the ovens)

Connellsville furnace	$6.00
Connellsville foundry	7.00
Wise county furnace	6.00
Wise county foundry	7.00
Pocahontas furnace	6.00
New River foundry	7.00
New River furnace	6.00

Market Prices

Cast Iron Pipe

(Class B Pipe)

Four-inch, Chicago	$58.50
Six-inch and over, Chicago	55.50
Four-inch, New York	57.50
Six-inch and over, New York	54.50
Four-inch, Birmingham	48.00
Six-inch and over, Birmingham	45.00

Class A pipe is $1 higher than Class B.

Iron and Steel Pipe

Base Pittsburgh

	Per cent off Black	Per cent off Galvanized
¼ to 3-inch, butt, steel	51	37½
¾ to 3-inch, butt, iron	33	17

Fire Clay Brick

(First Quality)

Pennsylvania	$45.00 to $55.00
Missouri-Illinois	55.00 to 65.00
Ohio	45.00 to 50.00
Kentucky	45.00 to 55.00
New England	55.00 to 65.00

Fire Clay Brick

(Second Quality)

Pennsylvania	$40.00 to $50.00
Ohio	35.00
New England	48.00 to 58.00

Silica Brick

Pennsylvania	$50.00 to $60.00
Chicago	55.50 to 65.50
Birmingham	45.00 to 55.00

Coke Oven By-Products

(Spot—Per Gallon at Producer's Plant)

Pure benzol	$0.39 to $0.41
Toluol (nominal)	1.70 to 1.80
Solvent naphtha	.19 to .22

(Per Pound at Producer's Plant)

Phenol	$0.52

(Per 100 Pounds at Seaboard)

Sulphate of ammonia	$4.90 to $5.00

(Contract—Per Gallon at Producer's Plant)

Pure benzol	$0.39 to $0.41
Toluol	nominal
Solvent naphtha	.19 to .22
Creosote oil (25%)	.33 to .35
Pitch (per ton at plant)	8.00 to 20.00

(Per Pound at Producer's Plant)

Phenol (nominal)	$0.52

(Per 100 Pounds at Seaboard)

Sulphate of ammonia	nominal

Miscellaneous

Gas oil, per gal., F. O. B. Okla	5⅛ to 6¼c
Drip oil, per gal	5 to 25c
Gas works tar, per gal	2¾ to 4c
Gas coal, per ton, F. O. B. mine—	
Ky. district, mine run	$2.40
Ky. district, screened lump	2.65
Fairmount district, mine run	2.45
Fairmount district, screened lump	2.70
Industrial coke, run of oven, F. O. B. St. Louis, egg size	9.45

[Gas coke, domestic use, based on anthracite price.]

AMERICAN IRON OXIDE COMPANY

Pittsburgh, Pa.

Mines, Manufacturers and Guarantees

Pure Iron Oxide

Manufactured from 76% LIMONITE ORE

Let Us Know Your Wants

DIRECTORY OF GAS COMPANIES AND OFFICIALS. Supplement to THE GAS RECORD, Chicago, Nov. 14, 1917.
PRICE 50 CENTS

GAS COMPANIES AND THEIR OFFICIALS

KEY:—V. P.-vice-president; G. M.-general manager; M.-manager; N.-new business manager; Dist. M.-district manager; L. M.-local manager; S. M.-sales manager; E.-engineer; S.-superintendent; I.-industrial; ✠-purchasing agent; C.-coal gas; O.-oil gas; W.-water gas; circled star (✪) indicates a change since last edition. Blank line, 3 circled stars in center, indicates company name removed. Numbers in parenthesis after operating companies' names check with corresponding numbers in list of holding companies or syndicates. Corrections and suggestions invited—THE GAS RECORD, Monadnock Block, CHICAGO.

AMERICAN GAS SYNDICATES AND THEIR HOLDINGS

CALIFORNIA.

No. 4—LOS ANGELES—Southern California Gas Co., 805 Garland Bldg.
V. P.-G. M.—A. B. Macbeth; Sec.—L. M. Farnham; Pur. Agt.—N. L. Morse✠; Chf. S.—F. J. Schafer; E.—Jos. M. Berkley.
Operating at Los Angeles, Glendale, San Bernardino, Gardena, Riverside, Colton, Arlington and Rialto.

No. 6—LOS ANGELES—Southern Counties Gas Co. of Calif., 724 So. Spring St.
Pres.—M.—F. R. Bain; E.—M. R. Thompson; S.—Frank S. Wade; I.—Fred C. Champion; Sec.—W. S. McFarland.
A consolidation of Southern Counties Gas Co., Long Beach (Calif.) Gas Co.✠ and gas properties of the Southern Calif. Edison Co.

No. 10—SAN FRANCISCO—The W. F. Boardman Co., 718 Mission St.
Pres.—W. F. Boardman; V. P.—Tom P. Robertson; Sec.-Treas.—Geo. H. Eckert.
Operates Oregon Gas & Electric Co. at Grant's Pass, Medford, Ashland and Roseburg; Ukiah Gas Co., Ukiah, Calif.; Guadalajara Gas Co., Guadalajara, Jalisco, Mex.

No. 12—SAN FRANCISCO—California Light & Fuel Co., 626 Pacific Bldg.
Pres.—L. P. Lowe; Sec.—S. M. McLaughlin, Engineers: Economic Gas Co., Los Angeles; Palo Alto (Calif.) Gas Co.; Nevada Gas Co., Tonopah, Nev.

No. 1—SAN FRANCISCO—Central California Gas Co., Hobart Bldg.
Pres.—C. S. S. Forney; V. P.—R. L. Radke; Sec.-Treas.—John Castera; M.—W. A. White.
Operates gas plant at Visalia with reserve plant at Porterville. Supplies Visalia, Tulare, Farmersville, Exeter, Lindsay, Strathmore and Porterville.

No. 14—SAN FRANCISCO—Coast Counties Gas & Electric Co. 454 California St.
Pres.—S. W. Coleman; E.—W. R. Van Bokelen✪; N.—G. P. Egleston.
Operates at Santa Cruz, Watsonville, Hollister and the Gilroy (Calif.) Gas Works, Contra Costa Gas Co. at Martinez, Pittsburgh, Antioch, Concord, Crockett, Calif.

No. 8.—SAN FRANCISCO—Coast Valleys Gas & Electric Co. Executive offices, 58 Sutter St.
P. and G. M.—H. F. Jackson; Sec.-Treas.—F. J. Bianchard; Pur. Agt.—L. C. Helfrich✠; G. S.—M. C. McKay; N.—F. D. Baker.
Operates at Monterey, Pacific Grove, Carmel-by-the-Sea, Salinas, King City, Soledad, Gonzales, Chular.

No. 16—SAN FRANCISCO—Northern California Power Co., 995 Market St.
Pres.—W. F. Detert; Sec. & Pur. Agt.—Edward Whaley; G. M.—E. V. D. Johnson.
Operates Northern Calif. Power Co., Keswick Electric Power Co.; Battle Creek Power Co.; Redding Water Co.

No. 18—SAN FRANCISCO—Pacific Gas & Electric Co., 445 Sutter St.
Pres.—Frank G. Drum; V. P. & G. M.—John A. Britton; V. P. & Treas.—A. F. Hockenbeamer; Sec. & Asst. Treas.—D. H. Foote; Pur. Agt.—John H. Hunt✠; E.—E. C. Jones; Industrial E.—H. P. Pitts. Supplies gas to over 50 California towns and cities.
District Managers: F. A. Leach, Jr., Oakland; H. B. Heryford, Chico; Ralph A. Aver, Colusa; M. L. Neely, Fresno; L. H. Hartsock, Nevada City; J. E. Poingdestre, Marysville; W. H. Foster, San Rafael; O. E. Clark, Napa; H. Weber, Petaluma; E. W. Florence, Redwood City; C. W. McKillip, Sacramento; G. C. Holberton, San Francisco; J. D. Kuster, San Jose; M. G. Hall, Santa Rosa; A. J. Stephens, Vallejo; W. E. Osborn, Woodland.
Supts. of Gas Works; A. C. Beck, Oakland; Edward S. Jones, Sacramento; Supts. of Distribution: Geo. Kirk, Oakland; D. E. Keppelman, San Francisco.

COLORADO.

No. 22—BOULDER—Northern Colorado Power Co.
Pres.—Guy E. Tripp; Sec.—John Seager; V. P. & G. M.—H. U. Wallace.
Operates: Cheyenne (Wyo.) Light, Fuel & Power Co. Boulder (Colo.) Elec. Lt. & Pr. Co.; Western Lt. & Pr. Co., Lafayette, Colo.

FLORIDA.

No. 28—JACKSONVILLE—Southern Utilities Co.
G. M.—C. I. Day; Pur. Agt.—C. S. Bergh.✠

ILLINOIS.

No. 27—AURORA—Copley Gas & Elec. Syndicate.
Pres.—Ira C. Copley; G. M.—Carroll Miller; A. G. M.—William Willett; N.—H. W. Edmund. Owns: Western United Gas & Elec. Co., operating gas plants at Aurora, Elgin and Joliet; Murphysboro (Ill.) Water Wks. & Elec. & Gas Light Co.; Southern Ill. Gas Co., Marion, Ill.

No. 29—CHAMPAIGN—Illinois Traction System (McKinley Syndicate).
Pres.—W. B. McKinley; Vice-Pres.—Geo. M. Mattis and H. E. Chubbuck; Sec.—T. B. McCaulay; Treas.—G. M. Mattis; H. J. Vance, Peoria✠; E.—F. W. Bedard; A. E.—R. B. Richardson; G. M.—H. E. Chubbuck.

(Illinois—Continued)

Operates: Danville St. Ry. & Light Co., Urbana & Champaign Ry., Gas & Elec. Co., Decatur Ry. & Light Co.; Jacksonville Ry. & Lt. Co.; Jefferson City (Mo.) Lt., Heat & Pr. Co.; Atchison (Kans.) Ry., Lt. & Pr. Co.; Galesburg (Ill.) Gas & Elec. Lt. Co.; Cairo (Ill.) Gas Co.; Citizens Lighting Co., LaSalle, Ill.; Clinton (Ill.) G. & E. Co.; Madison County Lt. & Pr. Co., Carlinville, Ill.; Oskaloosa (Ia.) Lt. & Fuel Co.

No. 30—CHICAGO—American Coal & By-Product Coke Co., 608 So. Dearborn St.
Pres. and G. M.—Arthur Roberts; S.—Dan. M. Rugg; E.—M. W. Ditto.
Operate by-product plants for Chattanooga (Tenn.) Gas & Coal Products Co.; Dover By-Products Coke Co., Canal Dover, O.; Union By-Products Coke Co., Canal Dover, O.; Union By-Products Coke Co., Buffalo, N. Y.; Geo. W. Niedringhaus and associates, Granite City, Ill.

No. 31—CHICAGO—The K. L. Ames Syndicate, Womans' Temple Bldg.
Pres.-G. M.—K. L. Ames; E.—Geo. F. Goodnow.
Owns and operates: Kokomo (Ind.) Gas Co.; Jacksonville (Fla.) Gas Co.

No. 32—CHICAGO—Gas & Electric Improvement Co., 39 So. La Salle St.
Pres.—E. C. Beach; V. P. and E.—Geo. F. Goodnow; Sec.—H. J. Campbell; Treas.—A. V. Foster.
Operates Austin (Tex.) Gas Lt. Co., Benton Harbor & St. Joseph (Mich.) Gas & Fuel) Co.; Ft. Madison (Ia.) Gas Light Co.; Palestine (Tex.) Lt., Ht. & Pr. Co.

No. 34—CHICAGO—H. M. Byllesby & Co., Continental & Commercial Bank Bldg.
Pres.—H. M. Byllesby; V. P.—A. S. Huey, J. J. O'Brien, O. E. Osthoff, G. H. Harries, Elmer Dover, R. J. Graf; Sec.—R. J. Graf; A. Sec.—M. A. Morrison, W. F. Moss; Treas.—J. J. O'Brien; Asst. Treas.—W. H. Clarke, B. W. Lynch; E.—Otto Osthoff✠; A. E.—W. R. Thompson; M. E.—H. Boyd Brydon; I.—R. G. Hunt, ass't to V. P. in charge of operations. Operates: Oklahoma Gas & Elec. Co., Oklahoma City; Muskogee Gas & Elec. Co., Muskogee & Ft. Gibson, Okla.; Mobile (Ala.) Electric Co.; Ft. Smith Lt. & Traction Co., Ft. Smith & Van Buren, Ark.; **Northern States Power Co.,** Div. Hdqrs: Minneapolis, Fairbault, Stillwater, Mankato, Cannon Falls, Northfield, St. Paul and South St. Paul, Minn., Hudson, Wis. (St. Croix Gas Co.), and Platteville, Wis.; Fargo, Grand Forks, Minot, N. D.; Galena, Ill.; Sioux Falls, S. D.; Northern Idaho & Montana Power Co., at Kalispell, Mont., and Sandpoint, Idaho, and Newport, Wash.; Tacoma, (Wash.) Gas Co.; Enid (Okla.) Elec. & Gas Co.; El Reno (Okla.) Gas & Elec. Co.; The Ottumwa (Ia.) Ry. & Lt. Co.; San Diego (Cal.) Con. Gas & Elec. Co.; Everett (Wash.) Gas Co.; **Oregon Power Co.,** Marshfield, Eugene, Albany, Corvallis, Dallas, Independence, Monmouth, Oregon; the Southwestern General Gas Co., Fort Smith, Ark.; Olympia (Wash.) Gas Co.; **Western States Gas & Elec. Co.,** Stockton, Richmond and Eureka, Cal.; **Arkansas Valley Ry., Lt. & Pr. Co.,** Pueblo, Victor, Cripple Creek, Rocky Ford, La Junta and Canon City; **Louisville Gas & Elec. Co.**

No. 38—CHICAGO—Metropolitan Gas & Electric Co., Harris Trust Bldg.
Pres.—Rufus C. Dawes; Treas.—Henry M. Dawes; E.—Jos. C. Markley.
Owns and operates: Southwestern Gas & Elec. Co., Shreveport, La., and Texarkana, Tex.; Mobile (Ala.) Gas Co.; Central Indiana Gas Co. of Muncie (headquarters), Anderson, Marion; Alexandria, Elwood, Fairmount, and Hartford City, Ind.; Jackson Co. Lt. Ht. & Pr. Co., of Independence, Mo.; Beaumont (Tex.) Gas Lt. Co.; Seattle (Wash.) Lighting Co.; Mh. Clemens (Mich.) Gas Light Co.

No. 40—CHICAGO—Elston & Co., 39 So. La Salle St.
Pres.—I. C. Elston, Jr.; V. P.—A. C. Allyn; Sec.-Treas.—Jos. N. McCallum.
Control The Indiana Gas Light Co., operating plants at Noblesville and Tipton, Ind. Also, Lenawee County Gas & Electric Co., Adrian, Mich.; Vicksburg Light & Traction Co., Vicksburg, Miss. & St. Charles Lighting Co., St. Charles, Mo.; Dubuque (Ia.) Elec. Co.; Northern Ia. Gas & Elec. Co., Hdqrs., Humboldt, Ia. serving 20 towns in Northern Iowa; gas at Eagle Grove.

No. 46—CHICAGO—Middle West Utilities Co., 72 W. Adams St.
Pres.—Samuel Insull; V. P.—Martin J. Insull, John F. Gilchrist; Sec.—E. J. Doyle; Treas.—R. W. Waite; Asst. Sec.—Oliver E. McCormick; Commercial M.—J. Paul Clayton; Pur. Agt.—Charles Harding; 72 West Adams St., Chicago.✠
Controls and operates following gas properties:

Illinois Northern Utilities Co.
C. H. Luedeking, Dixon, Ill.✠
Belvidere, DeKalb, Dixon, Geneseo, Mendota, Morrison, Rock Falls, Sterling and Sycamore, Ill.

Central Illinois Public Service Co.
D. R. Truax, Mattoon, Ill.✠
Beardstown, Charleston, Macomb, Mattoon,

(Illinois—Continued)

Pana, Paris and Taylorville, Ill.

Interstate Public Service Co.
C. H. Dallow, Board of Trade Bldg., Indianapolis, Ind.✠
Bedford, Greenfield, New Castle ,Seymour and Shelbyville, Ind.; Franklin (Ind.) Water, Light & Power Co.; Central Indiana Lighting Co., Bloomington, Ind.

United Gas & Electric Co.
C. R. Bohannan, New Albany, Ind.✠
Jeffersonville and New Albany, Ind.

Twin State Gas & Electric Co.
Howard L. Olds, V. P., Dover, N. H.✠
Bennington, Vt.; Brattleboro, Vt.

Michigan Gas & Electric Co.
Ishpeming, Negaunee, Houghton and Hancock, Mich.

Missouri Gas & Electric Service Co.
Lexington, Marshall, Mo.

Kentucky Utilities Co.
Shelbyville, Ky.; Harry Reid, V. P.

Chickasha Gas & Electric Co.
Chickasha, Okla., Fred W. Insull.

Michigan Gas & Electric Co.
Three Rivers, Mich.; Paul Simmons, Mgr.

Citizens Gas Light Co.
Jackson, Tenn.

No. 48—CHICAGO—Public Service Co. of Northern Illinois, 72 W. Adams St.
Pres.—Samuel Insull; V. P.—Frank J. Baker, Charles A. Munroe, John H. Gulick; Asst. to the V. P.—John G. Learned; Gas Con. Agent—E. J. Caspers; E.—C. W. Bradley; E. of Mfg.—Andrew McIntyre; I. E.—Horace H. Clark; George R. Jones.✠
Gas Plants: Evanston, Oak Park, Blue Island, Weber, Morris, Ottawa, Streator, Pontiac and Kankakee.

No. 47—CHICAGO—North American Light & Power Co., 2013 Peoples Gas Bldg.
Pres.—Clement Studebaker, Jr., South Bend, Ind.; V. P. & G. M.—W. A. Baehr; Sec.—Henry L. Hanley; Treas.—Scott Brown (all of Chicago).
Hold and Operate: Adair County Lt., Pr. & Ice Co. and Mo. Ht., Lt. & Pr. Co., of Kirksville, Mo.; Moberly (Mo.) Lt. & Pr. Co.; Huntsville (Mo.) Lt. & Pr. Co.; Boonville (Mo.) Lt., Ht. & Pr. Co.; Ardmore (Okla.) City Gas Co.; Durant (Okla.) Consumers Lt. & Pr. Co.; Washingtn C. H. (O.) G. & E. Co.; Pocatello (Ida.) Gas & Pr. Co.; Waurika (Okla.) Consumers Lt. & Pr. Co.; Southern Okla. Pipe Line Co., Ardmore, Okla.

No. 49—CHICAGO—United Lt. & Rys. Co. (Financial Office.)
Asst. to Pres.—Wm. H. Hulswitt.

No. 50—Utilities Development Co., 327 So. LaSalle St.

No. 51—CHICAGO—Wisconsin Pr., Lt. & Ht. Co., 72 W. Adams St.
Pres.—Marshall E. Sampsell; V. P.—Martin J. Insull; Sec.-Treas.—Henry M. Brooks✠; Asst. Sec.-Treas.—M. Murphy.

No. 49—CHICAGO—E. A. Potter, Rector Bldg.
Pres.—E. A. Potter; V. P.—Jno. E. Vail, Pueblo, Colo.; Treas.—Frank A. Groves.
Controls Madison, Ind.; Nebraska City, Neb.; Baraboo, Wis.; Creston, Ia., and Manhattan, Kans.

No. 89—HILLSBORO—J. J. Fry Syndicate.
Owns Southern Illinois Lt. & Pr. Co., operating at Mt. Vernon, Greenville, Litchfield, and Hillsboro.

INDIANA.

No. 160—HAMMOND—Northern Indiana Gas & Electric Co.
Pres.—C. H. Geist; V. P.—B. S. Walters, S. E. Mulholland; Sec.—G. W. Curran; Treas. H. C. Miller; Pur. Agt.—J. A. Pearson (care U. G. I. Co., Phila.)✠
Northern Division (B. S. Walters, Hammond, V. P.) operates Hammond, Michigan City and South Bend; also: **Southern Division** (S. E. Mulholland, Ft. Wayne, V. P.) operates LaFayette, Lebanon, Logansport, Fort Wayne, Bluffton, Decatur, Frankfort, Crawfordsville and Wabash; **Ohio Division** (E.R. Curtin, Lima, president) operates Lima, St. Marys, Wapakoneta, Celina, Recovery, Cridersville and Coldwater.

No. 52—INDIANAPOLIS—Interstate Public Service Co. (46)
Pres.—C. P. Wilson; V. P.—Harry Reid; Sec.-Treas.—Ira E. Guthrie; M.—E. Vanarsdal; E—Geo. C. Hyde; N.—C. J. Eaton; Pur. Agt.—C. H. Dallow.✠
See 46 for list of plants.

No. 58—LAPORTE—The W. A. Martin Gas Syndicate.
Operates Greencastle (Ind.) Gas & Elec. Co., Rochester (Ind.) Gas & Fuel Co.

No. 59—RIDGEVILLE—Consolidated Gas & Oil Co.✪
A. M.—E. J. Condon.
Owns plants at Ridgeville, Red Key and Dunkirk, Ind.

IOWA.

No. 60—CEDAR RAPIDS—Iowa Electric Co.
Pres. and G. M.—Wm. G. Dows; V. P.—Isaac B. Smith and Jno. A. Reed; Sec.—C. S. Woodward; Treas.—Isaac B. Smith; A. G. M.—R. S. Cook; S. C. Dows.✠
Operates gas plants at Fairfield, Iowa Falls,

(Over)

(Iowa—Continued)

Marshalltown, Perry and various electric and railway plants.

No. 66—CHARLES CITY—R. K. Runner Gas Syndicate.
Pres.—R. K. Runner.
Owns Austin, Minn.; Charles City, Ia., and Cherokee, Ia.

No. 61.—IOWA CITY—Iowa Gas & Elec. Co.
Pres.—Geo. Carson.
Owns gas plants at Mt. Pleasant and Washington, Ia.

No. 62—NEWTON—American Gas Construction Co.
G. M.—I. C. Tenny.
Owns Ames, Ia.

KANSAS.

No. 63—JUNCTION CITY—Eakin-Donelan Co.
Partners—L. R. Eakin and J. J. Donelan.
Owns and operates: Concordia Gas Co.; Junction City Gas Co.; Abilene Home Gas Co., Great Bend Gas Co., all in Kansas.

LOUISIANA.

No. 64—NEW ORLEANS—American Cities Co., 201 Baronne St. (130)
Pres.—Francis T. Homer; V. P.—E. G. Connette; V. P.—Lee Benoist; Sec.-Treas.—H. J. Pritchard, Ass't Sec.-Treas.—Hugh E. Vincent.
Controls: N. O. Ry. & Lt. Co., Birmingham (Ala.) Ry., Lt. & Pr. Co.; Houston (Tex.) Ltg. & Pr. Co.; Little Rock Ry. & Elec. Co., Memphis St. Ry. Co., Knoxville Ry. & Lt. Co.

MARYLAND.

No. 65—BALTIMORE—General Utilities & Operating Co., Munsey Bldg.
Pres.—J. C. M. Lucas; V. P.-G. M.—F. R. Weller; Sec.-Treas.—H. P. Lucas.
Controls Americus (Ga.) Ltg. Co. and several electric properties.

MASSACHUSETTS.

No. 68—BOSTON—Commonwealth Gas & Electric Cos., 78 Devonshire.
Pres.—Alonzo P. Weeks; Sec.—Elihu G. Loomis; Treas.—Paul B. Webber.✠
Owns: Marlboro-Hudson Gas Co., Marlboro, Mass., and Athol (Mass.) Gas & Elec. Co.

No. 70—BOSTON—Massachusetts Gas Cos.
111 Devonshire St.
Pres.—J. L. Richards; Sec.—A. S. Bull; Treas.—E. M. Richards.
Controls Boston Con. Gas Co., E. Boston Gas Co., Citizens Gas Lt. Co., of Quincy, Mass.; Newton & Watertown Gas Lt. Co., of Newton, Mass.; New England Gas & Coke Co., of Everett, Mass.; New England Coal & Coke Co., of Boston.

No. 72—BOSTON—Massachusetts Lighting Cos., 77 Franklin St.
Trustees—Arthur E. Childs, Percy Parker, C. D. Parker, Bowen Tufts, Wm. M. Butler.
Officers: Pres.—Arthur E. Childs; Sec-Treas.—George F. Howland; Asst. Sec.—C. N. Burnell.

Operating Companies.
Pres.—Arthur E. Childs; Sec.-Treas.—George F. Howland; G. M.—Guy K. Dustin; E.—R. Y. Conklin✪; N.—Wm. Gould✪; H. L. Ogden.✠ Adams Gas Light Co., Arlington Gas Light Co., Clinton Gas Ligt Co., Gloucester Gas Light Co., Leominster Gas Light Co., Lexington Gas Co., Milford Gas Light Co., North Adams Gas Light Co., Northampton Gas Light Co., Spencer Gas Co., Williamstown Gas Co., Worcester County Gas Co.

Gas & Electric Improvement Co., Boston.
Gas E.—R. Y. Conklin; N.—Wm. Gould; H. L. Ogden.✠

The Light, Heat & Power Corporation, Boston.
Sec.-Treas.—C. N. Burnell.

Daytona (Fla.) Public Service Co. and New Smyrna (Fla.) Public Service Co.
Pres.—Arthur E. Childs; Sec.-Treas—C. N. Burnell; Bus. M.—J. C. Lyle; G. M.—G. K. Dustin.

No. 74—BOSTON—Stone & Webster, 147 Milk St. Branches: New York and Chicago.
Partners: Chas. A. Stone, Edwin S. Webster, Russel Rob, Henry G. Bradlee, Jno. W. Hallowell, H. G. Bradley and D. P. Robinson; Gas Engineer, C. W. Hunter.
Operates: Blackstone Valley Gas & Elec. Co., Fall River, (Mass.) Gas Works, Harverhill (Mass.) Gas Lt. Co., Paducah (Ky.) Traction & Lt. Co., Puget Sound Traction, Lt. & Pr. Co., of Bellingham, Wash.; Keokuk (Ia.) Electric Co., Conn. Power Co., New London, Conn., Baton Rouge (La.) Electric Co.; Carson City (Nev.) Coal Gas Co.; Columbus (Ga.) Gas Light Co.; Pawtucket (R. I.) Gas Co.; Reno (Nev.) Pr., Lt. & Wtr. Co.

No. 76—BOSTON—Charles H. Tenney & Co., 201 Devonshire St.
Pres.—Chas. H. Tenney; V. P.—A. B. Tenney and D. E. Manson; 3rd V. P.—H. T. Sands; Sec.—H. P. Wood; Treas.—E. A. Bradley; A. Treas. & Aud.—H. A. Gidney; Pur. Agt.—F. F. Mooney✠; E.—Frank C. Sargent; N.—John West; Advtg. M.—Palmer York.
Represents: Suburban Gas & Elec. Co., Revere, Mass.; Peoples Gas & Elec. Co., Oswego, N. Y.; Springfield (Mass.) Gas Lt. Co.; Rockland Light & Power Co., Nyack, N. Y.; Malden & Melrose (Mass.) Gas Lt. Co.; Fitchburg (Mass.) Gas & Elec. Lt. Co.; No. Boston Lighting Properties; Bristol & Plainville Tramway Co., Bristol, Conn.

MICHIGAN.

No. 78—DETROIT—W. E. Moss & Co., 710 Union Trust Bldg.
Treas.—W. E. Moss; E. and G. M.—B. O. Tippy.
Operates: Coldwater (Mich.) Gas, Lt. & Fuel Co.; Columbus (Ind.) Gas Lt. Co.; Fulton (N. Y.) Fuel & Lt. Co.; Grand Haven (Mich.) Gas Co.; Citizens Gas Co. of Hannibal, Mo.; Winston-Salem (N. C.) Gas *Co.; Monroe (Mich.) Gas, Light & Fuel Co.; Hillsdale (Mich.) Gas Light Co.*

No. 82—DETROIT—Henry M. Wallace Co., *810 Union Trust Bldg.*
Pres.—Henry M. Wallace; V. P.-G. M.—C. A. Schwarm; Sec.-Treas.—R. G. St. John✠; E.—H. L. St. John.

(Michigan—Continued)

Operates: Corpus Christi (Tex.) Gas Co.; Temple (Tex.) Gas Lt. Co.; Waxahachie (Tex.) Gas Co.

No. 84—GRAND RAPIDS—American Public Utilities Co. (The Kelsey-Brewer interests.) Gd. Rpds. Savings Bldg.
Chmn. Bd.—Charles B. Kelsey; Pres.-G. M.—Jos. H. Brewer; Sec.—Blaine Gavett✠; Treas.—W. J. Ripley; A. G. M.—Chas. O. B. Murphy; Chf. E.—L. B. Andrus; Gas E—G. R. Horning; N.—M. B. Wheeler.
Holland (Mich.) City Gas Co., Albion (Mich.) Gas Light Co., Valparaiso (Ind.) Lighting Co., Elkhart (Ind.) Gas & Fuel Co., Merchants Heat & Light Co., Indianapolis, Ind., Jackson (Miss.) Light & Traction Co., Boise (Ida.) Gas Light & Coke Co., Utah Gas & Coke Co., Salt Lake, Wisconsin-Minnesota Light & Power Co., serving Eau Claire, LaCrosse, Chippewa Falls, and Menominee, Wis., Red Wing, and Winona, Minn., and upwards of 20 smaller communities in immediate vicinity.

No. 85—GRAND RAPIDS—Howe, Snow, Corrigan & Bertles. Control Emporia (Kans.) Gas Co.; McAlester (Okla.) Gas & Coke Co.; Choctaw Natural Gas Co., Okla.

No. 86—GRAND RAPIDS—United Light and Railways Company, Michigan Trust Bldg.
Financial offices: 72 W. Adams St., Chicago; operating hdqrs.; Grand Rapids and Davenport, Ia.
Pres.—Frank T. Hulswit; V. P.-G. M.—Richard Schaddelee; V. P.—J. F. Porter; V. P.-Treas.—C. M. Hurd; V. P.-E.—T. J. Weber.
Operates: Chattanooga (Tenn.) Gas Co., Cedar Rapids (Ia.) Gas Co.; Muscatine (Ia.) Ltg. Co.; Ft. Dodge (Ia.) Gas & Elec. Co.; Iowa City (Ia.) Lt. & Pr. Co.; Peoples Gas & Elec. Co., Mason City, Ia.; La Porte (Ind.) Gas & E. Co.; Cadillac (Mich.) Gas Lt. Co., Ottumwa (Ia.) Gas Co.; also: The Tri-City Ry. & Lt. Co., which owns The Peoples Power Co. of Moline and Rock Island, Ill., The Peoples Lt. Co., of Davenport, Ia., and the Davenport (Ia.) Gas & Elec. Co.

No. 87—JACKSON—Michigan Light Co. (116).
Pres.—B. C. Cobb; V. P.—W. H. Barthold, T. A. Kenney; Sec.—J. K. Swanson✪; Treas.—A. B. Simoneau; G. M.—C. W. Tippy.
Owns gas and electric plants at Jackson, Flint, Bay City, Kalamazoo, Saginaw, Pontiac and Manistee.

No. 79—SAGINAW—Appleby & Wagner, Forester Temple.
Props.: B. G. Appleby and R. B. Wagner.
Own: Consumers' Gas Co., Waycross, Ga.; Gratiot County Gas Co., Alma, Mich.; Washington County Gas Co., Johnson City, Tenn.

No. 83—KALAMAZOO—Utilities Operating Co., 310 Peck Bldg.
Pres.—C. A. Runyan; Sec.-Treas. & G. M.—L. F. Ryall; G. S.—D. F. Burritt; E.—W. D. Birbeck.
Own gas plants at Allegan, Otsego, Plainwell, Sturgis and South Haven, Mich.; Auburn, Brazil, Garrett, Avilla and Kendallville, Ind.; Rochester, Minn.; Manitowoc, Wis.

MINNESOTA.

No. 80—MINNEAPOLIS—Public Improvement Co., 348 Security Bldg.
Pres.—D. A. Frerichs; A. M. & S.—W. J. Stinson; E.—W. R. Stinson.
Controls: Bemidji, Minn.; Montevideo, Minn., and Thief River Falls, Minn.

MISSOURI.

No 88—KANSAS CITY—Union Public Service Co., 1116 Commerce Bldg.
Pres.—C. A. Loomis; Treas. and G. M.—S. J. Mattocks; S.—Wm. A. Boss.✪
Operates: Gardner (Kas.) Gas Co.; Edgerton (Kas.) Gas Co.; Wellsville (Kas.) Gas Co.; Richmond & Princeton (Kas.) Gas Co.; Johnson Co. Gas. Co., Merriam and Shawnee, Kas.; Anderson Co. Lt. & Ht. Co., Colony & Welda, Kas.; Baldwin (Kas.) Gas Co.; Ottawa (Kas.) Gas & Elec. Co.; Weston (Mo.) Gas & Lt. Co.; Kansas Farmers Gas Co., Rosedale View, Kans.; Hoopeston, (Ill.) Gas & Elec. Co.; Miami Co. Gas Co., Paola, Ossawatomie, Weir, Rantoul, Kans.; Nowata County Gas Co., Nowata and Delaware, Okla.; Beggs Gas Co., Beggs, Okla.; Tri-City Gas Co., Altoona and Cherryvale, Kans., and Chelsea, Okla.; Weir (Kans.) Gas Co.; Johnson County Gas Co., Merriam, Shawnee, Lenexa and South Park, Kans.; Union Gas & Traction Co., Kansas City, Mo.

No. 90—ST. LOUIS—The Light & Development Co. of St. Louis, 750 Ry. Ex. Bldg.
Pres.—Hugo Wurdock; V. P.—J. A. Porter; Sec.—Horace W. Beck; Treas.—E. M. Kurtz; P. Ziegenfuss.✠
Operates: Cape Girardeau (Mo.) Public Utilities Co.; Paris (Ky.) Gas & Elec. Co.; Ft. Scott (Kas.) Gas & Elec Co.; Mitchell (S. D.) Power Co.; Oberlin (O.) Gas & Elec. Co.; Monmouth (Ill.) Pub. Serv. Co.

No. 92—ST. LOUIS—The Watts Engineering Co.
Pres.—A. R. Smyth✠;
Owns Columbia (Mo.) Gas Co.

NEBRASKA.

No. 91—OMAHA—Gas Construction Co., 48th and Leavenworth Sts.
John W. Towle, Karl E. Vogel (G. M.) and Geo. Osten.
Operate: Broken Bow (Neb.) Gas Co.

No. 93—OMAHA—Union Light & Power Co., 424 First Nat'l Bk. Bldg.
G. M.—Willis Todd; Sec.-Treas.—W. B. Roberts.
Operates North Platte (Nebr.) Lt. & Pr. Co. and Osceolo (Ia.) Southern Ia. Elec. Co.

NEVADA.

No. 94—RENO—Sierra-Pacific Electric Co. (Stone & Webster management.)
Pres.—Alfred Vonder Ropp; Sec.—A. K. Todd.
Controls: Carson City (Nev.) Coal Gas Co. and Reno Pr., Lt. & Water Co.

NEW JERSEY.

No. 96—MILLVILLE—Cumberland Gas Co.
Pres.—E. B. Goodwin; Sec.—Walter Owen; Treas.—Walter Wood (400 Chestnut St., Phila.); M., S. and Pur. Agt.—S. J. Franklin.✠
Operates: Millville Gas Lt. Co.; Citizens Gas Co. of Landis Tp., N. J.; Pittsgrove (N. J.) Gas Co.; Fairfield (N. J.) Gas Co.; Citizens Gas Co., Vineland, N. J.; Maurice River (N. J.) Gas Co.; The Commercial Township Gas Co. Port Norris, N. J.; Downe Township Gas Co., Newport, N. J., and Lawrence (Tp.) Gas Co., Cedarville, N. J., and Deerfield Gas Co., Rosenhayn, N. J.

No. 98—NEWARK—Public Service Gas Co., Public Service Terminal, 80 Park Place.
Pres.—T. N. McCarter; V. P. (Finance)—P. S. Young; V. P. (Public Relations)—E. W. Wakelee; Sec.—Percy Ingalls; Treas.—T. W. Van Middlesworth; Comptroller—W. S. Barker; V. P.-G. Mgr.—H. D. Whitcomb; A. G. M.—E. H. Earnshaw; G. S. of Dis.—J. A. Clark, Jr.; Ins. of Mfrs.—Jas. Lane; N.—R. R. Young; Asst. N.—Theo. Bunker; Asst. N.—J. P. Hanlan; Pur. Agt. J. A. Pearson, Broad & Arch Sts., Philadelphia.✠
Operates: (Essex Division) Essex & Hudson Gas Co.; East Newark (N. J.) Gas Lt. Co.; Morristown (N. J.) Gas Lt. Co.; (Hudson Division) Hudson Co. Gas Co.; (Passaic Division) Patterson & Passaic Gas & Elec. Co.; (Southern Division) South Jersey Gas, Elec. & Trac. Co.; Princeton Lt., Ht. & Pr. Co.; (Central Division) Somerset, Union & Middlesex Ltg. Co.; New Brunswick (N. J.) Gas Lt. Co.; Shore Ltg. Co.; (Bergen Division) Gas & Elec. Co. of Bergen Co.; Ridgewood (N. J.) Gas Co.

No. 97—TRENTON—Florida Utilities Co.
Moon Clay & Kaolin Co., 715 Broad St. Bk. Bldg.
J. Lefferts Conard, President.
Owns gas companies at Palm Beach, W. Palm Beach and Ocala, Fla.

NEW YORK.

No. 99—BROOKLYN—Brooklyn Union Gas Co., 176 Remsen St.
Pres.—Jas. H. Jourdan; Sec.—Henry E. McGowan.
Owns and operates: Flatbush Gas Co., 29th ward, Brooklyn; Newtown Gas Co., 2nd ward, Queens; Jamaica (Long Island) Gas Co.; Woodhaven (L. I.) Gas Co.; Richmond Hill & Queens County Gas Lt. Co., 4th ward, Queens.

No. 102—BUFFALO—Eastern Oil Co.
Pres.—Geo. V. Forman; V. P.—H. A. Forman; Treas.—C. R. Hawkins; Sec.—Edw. M. Wheeler; Pur. Agt.—F. D. Tracy✠; G. M.—Howard V. Thomas.
Operates: W. Va. Central Gas Co., Elkins, W. Va.; W. Va. & Md. Gas Co., Davis, W. Va., and Cumberland, Md.; Northern Natural Gas Co., Oakland and other Maryland towns, and Terra Alta, W. Va.; West Union (W. Va.) Gas Co.; Salem, (W. Va.) Natural Gas Co.; Glenville (W. Va.) Nat. Gas Co.

No. 103—BUFFALO—South Shore Natural Gas & Fuel Co., 842 Marine Bank Bldg.
G. M.—F. M. Lowry; Sec.-Treas.—J. A. Richie.
Owns: Dunkirk, N. Y. and other points.

No. 100—GENEVA—Empire Gas & Electric Co., 103 Castle St.
Pres.—E. H. Palmer; Sec.—L. G. Hoskins; Treas. and Pur. Agt.—C. H. Pierce✠; G. M.—H. L. Coleman; E.—H. O. Palmer.
Does all the gas and electric business in Auburn, Weedsport, Cayuga, Seneca Falls, Waterloo, Geneva, Phelps, Palmyra, Newark, Lyons and Clyde.

No. 105—NEW YORK—American Light & Traction Co., 120 Broadway.
Chm. of Bd.—Emerson McMillin; Pres.—Alanson P. Lathrop; V. P.—Marion McMillin; V. P., Sec-Treas.—C. N. Jelliffe; V. P.-E.—H. C. Abell; Asst. Sec.-Treas—T. M. Leahy; Auditor—James Lawrence; Counsel—C. W. Young.
Own practically all the capital stock of Binghamton (N. Y.) Gas Works; Consolidated Gas Co., of Long Branch, N. J.; Detroit (Mich.) City Gas Co.; Grand Rapids (Mich.) Gas Light Co.; Madison (Wis.) Gas & Elec. Co.; Milwaukee (Wis.) Gas Lt. Co.; Muskegon (Mich.) Traction & Ltg. Co.; St. Joseph (Mo.) Gas Co.; St. Paul (Minn.) Gas Light Co.; San Antonio (Tex.) Gas & Elec. Co.; So. St. Paul (Minn.) G. & E. Co.; West Allis (Wis.) Gas Co.; Wauwatosa (Wis.) Gas Co.

No. 106—NEW YORK—American Power & Light Co., 71 Broadway.
Pres.—F. G. Sykes; Sec.—M. H. Arning; E.—R. J. McClelland✠.
See also No. 110.

No. 107—NEW YORK—Consolidated Gas Co. 124-130 E. 15th St.
Pres.—Geo. B. Cortelyou; V. P.—W. R. Addicks, L. B. Gawtry, R. A. Carter; Sec.—R. A. Carter; Asst. Sec.—H. M. Brundage and F. R. Barnitz; Treas.—C. G. M. Thomas; Asst. Treas.—Benj. Whitely; Auditor—F. L. Lambrecht.
Owns and operates: Astoria (L. I.) Lt., Ht. & Pr. Co.; Central Union Gas Co., the Bronx, N. Y. City; N. Y. & Queens Gas Co., Flushing N. Y.; N. Y. Mutual Gas Lt. Co., N. Y. City; Northern Union Gas Co., the Bronx, N. Y. City; Northern Westchester Lighting Co., Ossining, N. Y.; Peekskill ((N. Y.) Ltg. & R. R. Co.; Standard Gas Lt. Co., N. Y. City; Westchester Ltg. Co., Mt. Vernon, N. Y.; New Amsterdam Gas Co., N. Y. City.

No. 133—NEW YORK—Associated Gas & Elec. Co., 43 Exchange Place.
Pres.—J. H. Pardee; Sec-Treas.—T. W. Moffat.
Controls: Homer and Cortland (N. Y.) Gas Light Co.; Norwich (N. Y.) Gas and Electric Co.; Ithaca (N. Y.) Gas & Elec. Co.; Oneonta (N. Y.) Lt. & Pr. Co.; Greenville (O.) Gas, Lt. Co.; Van Wert (Ohio) Gas Light Co. and Ky. Pub. Service Co. with

(New York—Continued)

plants at Bowling Green, Owensboro, Frankfort and Hopkinsville, Ky.

No. 109—NEW YORK—Brooks & Co., P. W., 115 Broadway.
As Eastern States Pub. Service Co. operates: N. J. Gas & Elec. Co., Dover, N. J.; Newton, (N. J.) Gas & Elec. Co.; Lambertville (N. J.) Pub. Service Co.
Also owns: Port Arthur (Tex.) Gas & Pr. Co. and Utah Valley Gas & Coke Co., Provo, Utah.
Pres.—A. F. Beringer; G. M.—W. E. McClintock.

No. 108—NEW YORK—Henry L. Doherty & Co. (Cities Service Co.), 60 Wall St.
Chm. of Bd.—Henry L. Doherty; Pres.—Frank W. Frueauff; V. P.—H. H. Scott; Sec.-Treas.—Louis F. Musil; Asst. Sec.-Treas.—Carle B. Gilbert; Pur. Agt.—F. J. Petura✠; G. M.—H. H. Scott; Gas E.—F. C. Weber; N.—George Williams; I. E.—H. O. Loebell; Eff. E.—H. D. Hancock.
Operates: Alliance (O.) Gas & Pr. Co.; Bartlesville (Okla.) Gas & Oil Co., Beaver Oil & Gas Co., Kingsville, Ont., Can.; Brantford (Ont.) Gas Co.; Bristol (Tenn.) Gas & Elec. Co.; Buckeye State Gas & Fuel Co., and Coshocton Gas Co. of Coshocton, O.; Carthage (Mo.) Gas Co.; Citizens Gas, Elec. & Heating Co., Mt. Vernon, Ill.; City Light & Traction Co., Sedalia, Mo.; Danbury & Bethel (Conn.) Gas & Elec. Lt. Co.; Denver (Colo.) Gas & Elec. Lt. Co.; Dominion Natural Gas Co. of Hamilton, Ont., Can.; Fremont (Neb.) Gas, Elec. Lt. & Pr Co.; Knoxville (Tenn.) Gas Co.; Lebanon (Pa.) Gas & Fuel Co.; Lincoln (Neb.) Gas & Elec. Lt. Co.; Massillon (O.) Elec. & Gas Co.; Meridian (Miss.) Lt. & Ry. Co., Montgomery (Ala.) Lt. & Water Pr. Co.; Pueblo (Colo.) Gas & Fuel Co.; Spokane (Wash.) Gas & Fuel Co.; Trumbull Public Service Co., Warren and Niles, O.; Toledo (O.) Ry. & Lt. Co.; Webb City & Carterville Gas Co., Webb City, Mo.; Woodstock (Can.) Gas Lt. Co.; Empire Gas & Fuel Co. of Kansas, Missouri and Oklahoma; Hattiesburg (Miss.) Traction Co.; Arkansas Valley Gas Co.; Glenwood Nat. Gas Co., Ltd. (Can.); Manufacturers Nat. Gas Co., Ltd. (Can.); Quapaw (Okla.) Gas Co.; So. Ontario (Can.) Nat. Gas Co., Ltd.; S. W. Oklahoma Gas & Fuel Co.; Washita (Okla.) Gas & Fuel Co.; West Oklahoma Gas & Fuel Co.; Niagara (N. Y.) Lt., Ht. & Pr. Co.; Wichita Natural Gas Co.; Wichita Pipeline Co.; Columbus (O.) Nat. Gas Co.; Medina (O.) Gas & Fuel Co.; Mansfield (O.) Gas Lt. Co.; Ingersoll (Can.) Gas Lt. Co.; Thorold (Can.) Nat. Gas. Co.; United Gas Co. (Can.); Salina (Kas.) Lt., Pr. & Gas Co.; Western Distributing Co. (Okla.).

No. 110—NEW YORK—Electric Bond & Share Co., 71 Broadway.
Pres.—S. Z. Mitchell; V. P.—F. A. Farrar; V. P.—E. K. Hall, G. E. Claflin, E. W. Hill; E.—R. J. McClelland✠
Controls: Carolina Power & Lt. Co., Raleigh, and Durham, N. C., operating Asheville (N. C.) Pr. & Lt. Co.; Utah Securities Co., operating at Ogden, Utah; American Pwr. & Lt. Co., operating Portland (Ore.) Gas & Coke Co.; Kansas Gas & Elec. Co. of Wichita, Kas; Pacific Pr. & Lt. Co. of Vancouver, North Yakima and Walla Walla, Wash.; Pendleton and Astoria, Ore., and Lewiston, Ida.; Texas Pr. & Lt. Co. of Brownwood, Denison, Cleburne, Paris and Waco, Tex.; Galveston (Tex.) Gas Co., El Paso (Tex.) Gas Co.; Hutchinson (Kans.) Gas & Fuel Co.; Newton (Kans.) Gas & Fuel Co.

No. 112—NEW YORK—Federal Light & Traction Co., 60 Broadway.
Pres.—E. N. Sanderson; V. P.—Francis Blossom, Craig Colgate, L. C. Gerry; Sec.—Jno. B. Marsh; Treas.—J. Dunhill; G. S. & Chf E.—C. H. Nichols.
Operates: Albuquerque (N. M.) Gas & Electric Co.; Consumers' Gas Co., Hot Springs, Ark.; Tucson (Ariz.) Gas, Elec. Lt. & Pr. Co.; Springfield (Mo.) Gas & Elec. Co.; Trinidad (Colo.) Elec. Trans. Ry. & Gas Co.; Gray's Harbor Ry. & Light Co., of Aberdeen, Wash.; and various electric and railway companies.

No. 114—NEW YORK—General Gas & Electric Co., 50 Pine St.
Pres.—W. S. Barstow; V. P.—Jos. B. Taylor; Sec.-Treas.—O. C. Swenson; Asst. Sec.—W. J. Reast; Pur. Agt. and G. M.—W. S. Barstow Management Ass'n.
Controls: Rutland (Vt.) Ry., Lt. & Pr. Co.; Sandusky (O.) Gas & Elec. Co.; Easton (Pa.) Gas Wks.; Interurban Gas Co., Nazareth, Pa.; Penna. Utilities Co., Easton, Pa.; N. J. Pr. & Lt. Co., Dover, N. J.; The Jersey Corp'n, Boonton, N. J.; Binghampton (N. Y.) Lt., Ht. & Pr. Co.

No. 116—NEW YORK—Commonwealth Pr. Ry. & Lt. Co., 14 Wall St.
Pres.—Anton G. Hodenpyl; V. P.—C. M. Clark and Geo. E. Hardy; Sec.-Treas.—Jacob Hekma; E.—W. H. Barthold.
Controls: Michigan Light Co. in Bay City, Flint, Jackson, Kalamazoo, Manistee, Pontiac and Saginaw, Mich.; Springfield (Ill.) Gas & Elec. Co., Evansville (Ind.) Public Utilities Co., Central Illinois Light Co., Peoria and Pekin, Ill.

No. 118—NEW YORK—Interstate Electric Corp'n., 141 Broadway. Operated by General Engineering & Management Corpn., 141 Broadway, N. Y.
Controls: Peoples Gas & Electric Co., Chillicothe, Mo.; Trenton (Mo.) Gas & Elec. Co.

No. 120—NEW YORK—Nassau & Suffolk Lighting Co., 149 Broadway.
Pres.—George MacDonald; V. P.—Charles Cooper; Sec.—Jos. MacDonald; Treas.—W. H. B. Cooper.
Operates: Nassau & Suffolk Lighting Co.'s plants at Garden City, *Hempstead, Freeport, Merrick, Mineola, Roosevelt and other Long Island points.*

(New York—Continued)

No. 122—NEW YORK—National Fuel Gas Co., 26 Broadway. (46)
Pres.—Walter Jennings; V. P. and Sec.—W. J. Judge.
Controls: United Natural Gas Co., Oil City, Pa.; Iroquois Natural Gas Co., Buffalo, N. Y.; Provincial Natural Gas & Fuel Co. of Ontario, Niagara Falls, Ont., Can.; Pennsylvania Gas Co., Warren Pa.; Clarion Gas Co., Oil City, Pa.

No. 124—NEW YORK—National Light, Heat & Power Co., 111 Broadway.
Pres. and G. M.—W. G. Perry; V. P.—A. H. Bickmore; Sec.-Treas.—Jno. F. Reilly; H. L. Olds, Brattleboro, Va.✠
Operates: Twin State Gas & Elec. Co., of Dover, N. H., Bennington and Brattleboro, Vt.

No. 73—NEW YORK—National Utilities Co., 61 Broadway.
Pres. Harry B. Ivers; V. P.—Arthur S. Ives; Treas.—R. A. Davidson; Sec.—R. Buchanan Jr.
Operates: Ft. Scott & Nevada (Mo.) Lt., Ht., Wtr. & Pr. Co.; N. J. Gas & Elec. Co., Dover, N. J.; Port Arthur (Tex.) Gas & Pr. Co.; Hillsboro (O.) Lt. & Fuel Co.

No. 126—NEW YORK—The North American Co., 30 Broad St. (Main office, 9 Clinton St., Newark, N. J.)
Chm. of Bd.-Treas.—Geo. R. Sheldon; Pres. Jas. D. Mortimer; Sec. and Asst. Treas.—Jas. F. Fogarty; V. P.—Henry H. Pierce; Asst. Treas.—Robt. Sealy; Asst. Sec.—F. H. Piske; Asst. Sec.—Robt. Randall. Operates: S. Louis Co. Gas Co., Webster Groves, Mo.; Wisconsin Edison Co., operating Wisconsin Gas Elec. Co., of Racine, Kenosha, Watertown and Burlington, Wis.; North Milwaukee Lt. & Fr. Co.; Wells Pr. Co.; Mil. Elec. Ry. & Lt. Co.; Mil. Lt., Ht. & Tr. Co.

No. 128—NEW YORK—Pearson Engineering Corp'n, 115 Broadway.
Operates gas plant at Rio de Janeiro, Brazil.

No. 130—NEW YORK—The United Gas & Electric Engineering Corp'n, 61 Broadway. Chairman of Board.—George Bullock, Pres.—E. G. Connette, Asst. to Pres.—M. D. Evans; V. P. Northern Properties—J. F. Wessel; Treas. & Asst. Sec.—A. L. Linn Jr.; Sec. & Asst. Treas.—J. A. McKenna; M. Rate &Statistical Dept.—J. H. Perkins; Gen. Commercial Mgr.—H. N. McConnell; Engineer Northern properties—J. W. Thomas; Gas E.—A. C. Howard; Electrical E.—P. B. Rice; Con. E.—L. J. Hirt; F. G. Robinson✠
Birmingham, Ala., 2100 First Ave.
V. P. in charge of Southern properties—J. S. Pevear, Asst. Sec. & Asst. Treas.—J. F. Muller, Jr; E. Southern properties—L. C. Datz, Gas E.—R. J. Titzel; Electrical E.—F. V. Underwood; Asst. Pur. Agt (New Orleans, La.).—J. R. McGivney✠
Controls: Altoona (Pa.) Gas Light & Fuel Co.; Citizens Gas and Fuel Co., Terre Haute, Ind.; Colorado Springs (Colo.) Lt. Ht. & Pr. Co.; Consumers Electric Lt. & Pr. Co., New Orleans; Elmira (N. Y.) Water, Lt & Rd. Co.; Harrisburg (Pa.) Lt. & Pr. Co.; Houston (Tex.) Gas & Fuel Co.; Lockport (N. Y.) Lt. Ht. & Pr. Co.; Richmond, (Ind.) Lt. Ht. & Fr. Co.; Union Gas & Electric Co., Bloomington, Ill.; Wilkes-Barre (Pa.) Co.; Birmingham (Ala.) Ry. Lt. & Pr. Co.; Houston, (Tex.) Lt. & Pr. Co.; New Orleans (La.) Gas Light Co.; Lancaster (Pa.) Gas Lt. & Fuel Co.; Columbia Gas Co., Lancaster, Pa.; Leavenworth (Kans.) Lt., Ht. & Pr. Co.

No. 131—NEW YORK—H. D. Walbridge & Co., 14 Wall St.
Controls: Dallas (Tex.) Gas Co.; County Gas Co., Dallas, Tex.; Johnstown (Pa.) Fuel Supply Co.; Penna Pub. Serv. Co., Clearfield, Pa.

No. 132—NEW YORK—The J. G. White Management Corp'n, 43 Exchange Place.
Chm. Fin. Com.—Jas. G. White; Pres.—J. H. Pardee; V. P.—J. K. Choate, A. L. Mathews and J. J. Mange; Sec.-Treas.—T. W. Moffat; Pur. Agt.—E. N. Chilson✠
Operates the Associated Gas & Electric Co., controlling Greenville (O.) Gas Lt. Co.; Homer & Cortland Gas Lt. Co., Cortland, N. Y.; Ithaca (N. Y.) G. & E. Co.; Norwich (N. Y.) Gas & Elec. Co.; Van Wert (O.) Gas Lt. Co.; also operates the Kentucky Public Service Co., operating in Bowling Green, Frankfort, Hopkinsville and Owensboro, Ky.; and Clarksville, Tenn. (Hdqrs. Kentucky Public Service Co. are with J. G. White Management Corp., the company's officers being J. I. Mange, Pres.; C. B. Greenidge, V. P.; S. J. Magee, V. P.; H. D. Fitch, V. P.; T. W. Moffatt, V. P.; H. B. Brown, Sec.-Treas; Eastern Pa. Lt., Ht. & Pr. Co.; Pottsville, Pa.; Helena (Mont.) Lt. & Ry. Co.; Thornapple Gas & Elec. Co., Hastings, Mich.; Palatka (Fla.) Pub. Serv. Co.; Oneonta (N. Y.) Lt. & Pr. Co.; Sanford (Fla.) Public Service Co.

No. 134—SYRACUSE—Allen & Peck, Vinney Bldg.
Edward F. Peck, V. P. & Treas.
Control Newport News and Hampton (Va.) Ry., Gas & Elect. Co.

No. 136—UTICA—Utica Gas & Elec. Co.
Pres.—J. C. Brady; V. P.—Wm. E. Lewis; Treas.—Geo. H. Stack; Auditor—Wm. J. McSorley; Sec.—M. Jesse Brayton; G. M. Gas Dept.—Wm. J. Cahill.
Operates the Utica plant; Central N. Y. Pr. Co., Canastota; Utica G. & E. Co., Little Falls; Utica G. & E. Co., Herkimer; Utica G. & E. Co., Ilion, N. Y.; Glens Falls (N. C.) Gas & Elec. Co.; Whitehall (N. Y.) Con. Lt. & Pr. Co.; Sandy Hill & Ft. Edward (N. Y.) United Gas, Elec. Lt., Ht. & Fuel Co.

..... NORTH CAROLINA. .....

No. 137—GREENSBORO—No. Car. Pub. Service Co.
Pres.—Bird S. Coler; G. M.—E. C. Deal; M.—C. H. Andrews✠
Operates: No. Car. Pub. Ser. Co., Greensboro, High Point, Salisbury and Spencer.

(North Carolina—Continued)

No. 138—RALEIGH—Carolina Power & Light Co. (110).
Pres.—Chas. E. Johnson; V. P.—D. F. McGee, Wm. Darbee, H. H. Carr; Sec.-Treas.—E. P. Summerson.
Owns Carolina Pr. & Lt. Co., Durham, N. C., and Raleigh, N. C.

..... OHIO. .....

No. 140—CLEVELAND—Continental Gas & Electric Corp'n, care of Otis & Co.
Pres.—C. S. Eaton; V. P.—W. H. Abbott; Sec.—Geo. W. York; Treas.—G. A. Coulton; E.—Geo. H. Harper; Pur. Agts.—Abbott & Eaton✠
Operates: Gage Co. Gas Lt. & Pr. Co., Beatrice, Neb.; Peoples Gas Co., Shenandoah, Ia.; Nebraska Ltg. Co., Plattsmouth, Neb.; Red Oak (Ia.) Gas Co.; York (Neb.) Gas Co.; Brandon (Man., Can.) Gas & Pr. Co.; Nebraska Gas & Elec. Co. and Iowa Gas & Elec. Co., both of Omaha.

No. 135—CLEVELAND—Consolidated Gas, Elec. & Water Co., 1123 Illuminating Bldg.
Pres.—H. Lindale Smith.
Operates: Menominie (Wis.) Gas Co., Hurley (Wis.) Gas Co., Ironwood (Mich.) Gas Co., Iron Mountain (Mich.) Gas Co.

No. 141—COLUMBUS—Ohio Cities Co.
Pres.—Beman G. Dawes.
Owns Columbus (O.) Gas & Fuel Co.; Dayton (O.) Gas Co. and Springfield (O.) Gas Co.

No. 139—NAPOLEON—Ohio Gas Light & Coke Co.
Pres.—G. B. Orwig; Sec.—B. A. Sloan; Treas.-G. M.—J. A. Sloan✠
Operates: Plants at Napoleon, Wauseon, Bryan, Stryker, Archbold and Delta, O.; Also associated at Vincennes, Ind., with the Central States Gas Co. (W. J. Hartnet, pres., H. J. Sloan, V. P.; J. A. Sloan, sec-treas.); and at Lawrenceville, Ill., with the Illinois Gas Co., which has plants also at Bridgeport, Sumner and Olney (W. J. Hartnet, pres., A. E. Lloyd, V. P., J. A. Sloan, sec.-treas.).

..... OKLAHOMA. .....

No. 144—BARTLESVILLE—Empire Gas & Fuel Co. (108).
Operates: Mineral Wells, Tex., Quapaw Gas Co., Bartlesville, and Wichita (Kans.) Natural Gas Co.

..... OREGON. .....

No. 143—PORTLAND—Pacific Power & Light Co. (110), 1217 Spalding Bldg. (See Elec. Bond & Share Co., N. Y.)
Pres.—Guy W. Talbot; Sec.-Treas.—Geo. F. Nevins; G. M.—Lewis A. McArthur; Chf. E.—H. H. Scholfield✪; N.—C. R. Young✪; W. N. Voegtley✠
Gas plants at Walla Walla, North Yakima and Vancouver, Wash.; Astoria and Pendleton, Ore., and Lewiston, Ida.

..... PENNSYLVANIA. .....

No. 142—PHILADELPHIA—The American Gas Co., West Washington Square.
Pres.—Morris W. Stroud; V. P.—J. C. Lowry; G. M.—S .P. Curtis; Pur. Agt.—F. D. Wharton✠; S.—J. D. Shattuck; E.—R. C. Cornish; Sec.—W. L. Fox; Treas.—J. B. Townsend.
Owns: Bangor (Me.) Gas Lt. Co.; Burlington (Vt.) Lt. & Pr. Co.; Consolidated Lt. & Pr. Co., of Kewanee, Edwardsville, Sheffield and Galva, Ill.; Kingston (N. Y.) Gas & Elec. Co.; Luzerne Co. Gas & Elec. Co., of Kingston, Nanticoke, Hazleton, Plymouth and Forty Fort, Pa.; Phila. Suburban Gas & Elec. Co. of Chester, Coatesville, Pottstown, Wyncote, West Chester, Phoenixville, Royersford Spring City, and other Pa., points. Petersburg (Va.) Gas Co.; Portage (Wis.) American Gas Co.; Rockford (Ill.) Gas Lt. & Coke Co.; St. Clair Co. Gas & Elec. Co., of Belleville (also operating E. St. Louis, (Ill.); Waukesha (Wis.) Gas & Elec. Co.; Waterloo (Ia.) Citizens Gas & Elec. Co.

No. 145—PHILADELPHIA—American Coal & Oil Co., 415 Crozer Bldg. and 704 Witherspoon Bldg.
Pres.—Howard W. Lippincott; Treas.—John J. Clarke; Sec.—Thos. Adams.
Controls: Columbia Co. Gas & Elec. Co., Philmont, Pa.; South Bethlehem (Pa.) Lt., Heat & Fuel Co.; Cape Co. Gas Co., Cape May, C. H., N. J.; Lehigh Valley Gas Co.; Bucks County Heat & Fuel Co., Newtown, Pa.; East Penn Gas Co. and Maracaibo (Venez., S. A.) Gas Co.

No. 146—PHILADELPHIA—Eastern Light & Fuel Co., Real Estate Trust Bldg.
Pres.—Clarence P. King; Sec.—J. C. Lightfoot, Jr.; Treas.—J. C. Lightfoot, Jr.; G. M. and Pur. Agt.—R. W. King✠; E.—C. A. S. Sinclair.
Operates: New Jersey Gas Co., Glassboro, N. J.; New Jersey Consolidated Gas Co., Philadelphia; Schuylkill Haven (Pa.) Gas & Water Co.; Wildwood (N. J.) Gas Co.; Pottsville (Pa.) Gas Co.

No. 147—PHILADELPHIA—Day & Zimmermann.
M.—F. P. Duggan; Lewistown, Pa.
Operate gas plants of the Penn. Central Light & Power Co. at Huntingdon, Lewistown; Eastern Shore Gas & Elec. Co., controlling the Cambridge (Md.) Gas, Elec. Lt. & Pr. Co.

No. 148—PHILADELPHIA—The C. H. Geist Co., Land Title Bldg.
Pres.—C. H. Geist; V. P.—C. H. Weak; Sec.-Treas.—H. A. Lang; G. M.—Harry S. Schutt✠
Operates: Freeport (Ill.) Gas Co.; Roanoke (Va.) Gas Lt. Co.; Atlantic City (N. J.) Gas Co.; Lansing (Mich.) Fuel & Gas Co.; East Chicago (Ind.) & Indiana Harbor Water Co.; Northern Alabama Gas Co., of Florence, Ala.; Wilmington (Del.) Gas Co.; Indianapolis (Ind.) Water Co.

No. 149—PHILADELPHIA—Girardville Gas Co., 4014 Chestnut St.

(Over)

(Alabama—Continued)

TALLADEGA—Talladega Lt. & Water Commission.—C.
M.—E. M. Osbourne.
TUSCALOOSA—Tuscaloosa Ry. & Utilities Co.—C.
G. M.—I. W. Raines✪✚; Gas M.—F. Maxwell.✪
WOODWARD—Woodward Iron Co.—F.
G. M.—J. J. Shannon; E. and S.—J. Drewson.

—Natural Gas Companies

FAYETTE—Fayette Light & Fuel Co.
M.—E. R. Taylor.

..... ARIZONA .....

BISBEE—Bisbee Improvement Co.—O.
M.—C. S. Thompson; E.—Frank Gulusha.
DOUGLAS—Douglas Gas Corp.—O.
M.—R. G. Arthur.
GLOBE—Globe Light & Power Co.—O.
M.—W. S. Sultan✚; E.—G. W. Evans.✪
MESA—South Side Gas & Elec. Co. (Supplies gas to Tempe.)
M.—H. L. Chandler✚; E.—F. W. Cerny, S.—J. T. Williams; N.—J. M. Carr.
NOGALES—Arizona Gas & Elec. Co.
M.—H. W. Kelsey; E.—Cole. Ives and Davidson; 61 Bdwy., N. Y.; Pres.—S. S. Proto; Sec.—Anton Proto.
PHOENIX—Pacific Gas & Electric Co.—O.
M.—H. L. Aller; E.—L. Y. Woodmansee. S.—W. C. Horneberger, J. M. Downie.✚
PRESCOTT—Prescott Gas & Electric Co.—O.
M.—M. V. Watson.
TUCSON—Tucson Gas, Elec. Lt. & Pr. Co. (112).—O.
M.—Frank E. Russell; E. and N.—E. E. Johnson✚; Auditor—W. E. Johnson.
WINSLOW—Winslow Gas Light & Heat Co.
M. and E.—Frank H. Hess.

..... ARKANSAS .....

HELENA—Helena Gas & Elec. Co. (150)—C. & W.
M. & N.—W. J. O'Brien✚; E.—Schofield Engineering Co., Philadelphia.

—Natural Gas Companies—

FT. SMITH—Clear Creek Oil & Gas Co.
S.—S. F. Hill; N.—W. A. Robertson.
FORT SMITH—Fort Smith Light & Traction Co. (34)
G. M.—D. C. Green✚; N.—K. C. Stotts.
HOT SPRINGS—Consumers Gas Co. (112).
M.—S. E. Dillon; S.—W. A. Bethel; N.—W. F. Boyer.
LITTLE ROCK—Arkansas Natural Gas Co. (164✚)
G. M.—J. Russell Munce; E.—T. G. Womack; S.—H. L. Snyder, Hope, Ark.; E. J. Cole, Pittsburgh.✚
LITTLE ROCK—Little Rock Gas & Fuel Co. (38)
M.—W. F. Booth✚; E.—J. C. Markley, Chicago; S.—B. J. Gifford.
LITTLE ROCK—Natural Gas Supply Co.
M.—C. H. Duttlinger; S.—T. E. Hudgens; N.—Dan. Shell.
MANSFIELD—Mansfield Gas Co.
M.—Leigh Kelley; S.—Latt Caldwell.
PINE BLUFF—Pine Bluff Nat. Gas Co. (164✚)
S.—M. D. Randolph.
TEXARKANA—Southwestern Gas & Elec. Co.
M.—W. L. Wood, Jr.; P. A. Bann.✚

..... CALIFORNIA .....

ALAMEDA—Pacific G. & E. Co. (18).
D. M.—Geo. C. Holberton.
AZUSA—Southern Counties Gas Co. (6)—O.
Dist. Agt.—F. H. Bivens.
BEAUMONT—Riverside County Gas & Power Co.—W.
M.—F. N. Hawes; E.—Henry Burkhardt; S.—J. W. Hammond.
BERKELEY—Pacific Gas & Elec. Co. (18)
M.—F. A. Leach, Jr. (Hdqtrs. at Oakland.)
BEVERLY HILLS—Southern Calif. Gas Co.
CHICO—Pacific Gas & Elec. Co. (18)—O.
Dist. M.—H. B. Heryford.
COALINGA—Coalinga Gas & Power Co.—O.
M.—G. W. Satchell.
COLUSA—Pacific Gas & Elec. Co. (18)—O.
Dist. M.—Ralph A. Aver.
CORONA—Southern Calif. Gas Co. (4).
L. M.—Jos. Shallenberger.
DINUBA—Riverbend (or Alta District) Gas Co.—O.
M.—L. W. Le Baron.
EL CENTRO—Imperial Valley Gas Co.—O.
G. M.—J. M. Ott; Sec.—Harry M. Ott, Brawley, Cal.
EL MONTE—Southern Counties Gas Co. (6)—O.
Dist. Agt.—F. H. Bivens.
ESCONDIDO—San Diego Consol. G. & E. Co.
Dis. Agt.—Lester A. Wright.
EUREKA—Western States Gas & Elec. Co. (20)—O.
M.—H. L. Jackman; E.—A. M. Sedgley; S.—W. H. Stoffer.✪
FOWLER—Fowler Gas Co.
M. & N.—Chester Patton.
FRESNO—Pacific Gas & Elec. Co. (18)—O.
M.—M. L. Neely; S.—Paul C. Funk; N.—H. C. Ross.
GARDENA—Southern Cal. Gas Co.
D. A.—D. A. Jones.
GILROY—Coast Counties Gas & Elec. Co. (14✚)—W.
Agt.—E. J. Sherman.✪
GLENDORA—Southern Counties Gas Co. (6)—O.
Dist. Agt.—F. H. Bivens.
HANFORD—Hanford Gas & Power Co.—O.
M.—E. E. Bush✚; N.-I.—A. W. Reynolds.
HEMET—Southwestern Gas Co.—O. (2)
M.—Claude H. Webber✚; E.—Jos. Scaranella.
HOLLISTER—Coast Counties Gas & Elec. Co. (14✚)—O.
S.—E. J. Sherman.
JACKSON—Jackson Gas Light Co.—C.
Prop.—B. E. Letang.
KING CITY—Coast Valley G. & E. Co.
S.—C. M. Armstrong.
LIVERMORE—Pacific Gas & Electric Co.
L. M.—E. W. *D'Ombrain.*

(California—Continued)

LONG BEACH—Southern Counties Gas (6)—O.
L. M.—J. K. Somers.
LOS ANGELES—Boardman Co., The W. F., 901 Higgins Bldg.
LOS ANGELES—Los Angeles Gas & Elec. Corp.
M. of O.—A. B. Day; M. of C.—C. A. Luckenbach; N.—H. J. Kister; T. B. Parks.✚
LOS ANGELES—Southern California Gas Co.—W & O
M.—A. B. MacBeth; S.—F. J. Schaefer; N.—F. C. Ingram.
Operates also at Colton.
LOS GATOS—Pacific Gas & Elec. Co. (18)
D. M.—J. D. Kuster.✚
MADERA—Madera Gas Co.—W.
M.—H. W. Burkhart.✪
MARYSVILLE—Pacific Gas & Electric Co. (18)—W.
L. M.—J. E. Poingdestre; S.—E. C. Johnson.
MARTINEZ—Contra Costa Gas Co. (14).
L. M.—R. B. Lees.✪
MERCED—San Joaquin Light & Power Co.—O.
M.—A. G. Wishon; S.—E. A. Quinn.✪
MODESTO—Modesto Gas Lt., Coal & Coke Co.—O.
M.—Frank A. Cressey, Jr.✚; S.—Chas. S. Northcutt.
MONROVIA—Southern Counties Gas Co. (6)—O.
Dist. Agt.—F. H. Bivens.
MONTEREY—Coast Valleys Gas & Elec. Co. (8)—O.
L. S.—C. H. Noack.
NAPA—Pacific Gas & Elec. Co. (18)—O.
Dist. M.—C. D. Clark.
NEEDLES—Needles Gas & Elec. Co.—O.
G. M.—R. S. Masson; E.—L. D. Miller; S.—J. W. Wadsworth; G. E. Linch✚
NEVADA CITY—Pacific Gas & Elec. Co. (18)
Dist. M.—L. N. Hartsock.
NEWPORT BEACH—Municipal Gas Co.—O.
M.—F. L. Rinehart.✪
OAKDALE—Oakdale Gas Co.—O.
M.—G. W. Anderson.
OAKLAND—Pacific Gas & Elec. Co. (18)—W.
Dist. M.—F. A. Leach, Jr.; S. of Wks.—A. C. Beck; S. of District—Geo. Kirk.
ONTARIO—Ontario-Upland Gas Co.—O.
M.—Geo. F. Pennebaker; S.—N. D. Plouff; N.—O. S. Roen.
OROVILLE—Pacific G. & E. Co.
M.—R. L. Van der Naillen; S.—A. A. Davis.
PALO ALTO—Municipal Gas Plant.✪
PETALUMA—Pacific Gas & Elec Co. (18)
Dist. M.—H. Weber.
PITTSBURG—Contra Costa Gas Co. (14)—O.
G. M.—S. Waldo Coleman; E.—Van E. Britton. (Both of San Francisco); L. M.—A. W. Hinz✪; S.—J. B. Kilfoyl.
POMONA—Southern Counties Gas Co. (6).
L. M.—F. W. Balfour.
RED BLUFF—Northern Calif. Pr. Co. (16)—O.
L. M.—Charles Hughes.
REDDING—Northern Calif. Pr. Co. (16)—O.
M.—E. V. D. Johnson; L. M.—W. G. Moores.
REDLANDS—Southern Calif. Gas Co. (4)
L. M.—E. H. Gimper.
REDWOOD—Pacific Gas & Elec. Co. (18)
Dist. M.—E. W. Florence; S.—W. T. Kellogg.✪
RICHMOND—Western States G. & E. Co. (20)—O.
M.—C. M. Brewer.
SACRAMENTO—Pacific Gas & Elec. Co. (18)—W.
Dist. M.—C. W. McKillipp; S.—E. S. Jones; N.—W. B. Baldwin.
ST. HELENA—Napa Valley Electric Co.—O.
Pres.—D. L. Beard; Sec.—G. S. Conner; S.—F. W. Millenz.✪
SALINAS—Coast Valleys Gas & Elec. Co. (8)—O.
L. S.—P. F. Kelley.
SAN BERNARDINO—Southern Calif. Gas Co. (4)—W.
SAN DIEGO—San Diego Consolidated Gas & Elec. Co. (34)—O.
M.—H. H. Jones; S.—R. L. Clarke; N.—A. E. Halloway (care San Diego G. & E. Appl. Co.)
SAN FRANCISCO—Pacific Gas & Elec. Co. (18)—W.
G. M.—Jno. A. Britton; E.—E. C. Jones; S. of Wks.—Dennis J. Lucey; S. of Distrib.—D. E. Keppelman; D. M.—Geo. C. Holberton; N.—W. S. Coleman; Indus. E.—H. P. Pitts.
SAN JOSE—Pacific Gas & Elec. Co. (18)—W.
Dist. M.—J. D. Kuster; S.—R. H. Hargreaves.
SAN LUIS OBISPO—Midland Counties Gas & Elec. Co.—O.
G. M.—A. G. Wishon; S.—E. A. Quinn.
SAN PEDRO—Southern Counties Gas Co. (6).
L. M.—J. T. Huntington.
SAN RAFAEL—Pacific Gas & Elec. Co. (18)—O.
Dist. M.—W. H. Foster; E.—Austin Rix.
SANTA BARBARA—Santa Barbara Gas & Elec. Co. (2)—O.
M.—R. H. Sterling; S.—B. F. Pearson.
SANTA CLARA—Santa Clara Municipal Gas Works—O.
M.—John Widney✪; S.—Jas. I. Dixon✚; N.—A. J. Oswald.
SANTA CRUZ—Coast Counties Gas & Elec. Co. (14✚)
L. M.—R. L. Cardiff.
SANTA MARIA—Santa Maria Gas & Pr. Co.
SANTA MONICA—Southern Counties Gas Co. (6)—O.
L. Agt.—Norman R. McKee.
SANTA ROSA—Pacific Gas & Elec. Co. (18)
M.—M. G. Hall.
STOCKTON—Western States Gas & Elec. Co. (34).
M.—Samuel Kahn; E.—J. E. Kelley; S.—D. E. Widdersheim; N.—H. B. Batchelder.
TURLOCK—Turlock Gas Co.—O.
G. M.—A. A. Caldwell; W. E. Keith.✚
UKIAH—Ukiah Gas Co. (10)—O.
G. M.—Geo. H. Eckert✚; S.—Harry C. Giles.
VALLEJO—Pacific Gas & Elec. Co. (18)

(California—Continued)

M.—A. J. Stephens.
VISALIA—Central California Gas Co. (1)—O
Pres.—C. S. S. Forney; Sec.—Jno. Custers.
M.—W. A. White.
WATSONVILLE—Coast Counties Gas & Elec. Co. (14✚)
L. M.—J. A. Schanbacher; S.—R. L. Cardiff.✪
WHITTIER—Southern Counties Gas Co. (6)
Also operates in Anaheim, Arcadia, Azusa, Covina, El Monte, Fullerton, Glendora, Monrovia, Orange, Placentia, Santa Anna, Sierra Madre, South Santa Anita and Tustin.
M.—F. R. Bain; S.—F. S. Wade; Dis. Agt.—W. G. Rich.
WILLOWS—Northern Calif. Power Co. (16)—O.
L. M.—Clifford Bartlett; S.—J. M. Rasmussen.
WOODLAND—Pacific Gas & Elec. Co. (18)
M.—J. W. Coons.

—Natural Gas Companies—

ANAHEIM—Southern Counties Gas Co. (6).
D. A.—S. D. Todd.
✪ ✪ ✪
BAKERSFIELD—San Joaquin Lt. & Pr. Corp.
L. M.—E. D. Farrow; Gas E.—Sherwood Grover; S.—W. F. Tyler; N.—A. K. Carson.
BAKERSFIELD—Valley Natural Gas Co.✪
M.—J. F. McMahon.✪
FRESNO—San Joaquin Lt. & Pr. Corp. (Bakersfield Dist.)
G. M.—A. G. Wishon; Gas E.—Sherwood Grover.
FULLERTON—Southern Counties Gas Co. (6).
D. A.—S. W. Todd.
GARDEN GROVE—Southern Counties Gas C. (6).
D. A.—Corwin Butterworth.
HUNTINGTON BEACH—City Gas Plant.
M.—Geo. W. Spencer; S.—F. L. Snyder.
LOS ANGELES—Midway Gas Co. (4)
G. M.—A. B. McBeth; N. L. Morse.✚
LOS ANGELES—Economic Gas Co. (12)—W & O
M.—J. W. Wrenn; E.—E. S. Bryant; N.—E. F. Alderman; R. G. Putney.✚
LOS ANGELES—Southern Counties Gas Co.
M.—F. R. Bain; E.—M. R. Thompson; S.—Frank S. Wade; I.—Fred C. Champion; Sec.—W. S. McFarland.
ORANGE—Southern Counties Gas Co. (6).
D. A.—Corwin Butterworth.
OXNARD—Ventura County Pr. Co.
G. M.—F. W. Hunter.
PLACENTIA—Southern Counties Gas Co. (6).
D. A.—S. W. Todd.
REDONDO BEACH—Western Fuel Gas & Power Co.
M.—R. E. Matteson; N.—A. L. Walton.
SACRAMENTO—Sacramento Gas Co.
M.—J. N. Jensen.
SAN BERNARDINO—Southern California Gas Co.
L. M.—C. M. Grow.
SAN FRANCISCO—Honolulu Consolidated Oil Co.
Pres.—A. C. Dericx.✪
SANTA ANA—Southern Counties Gas Co. (6).
Dist. Agt.—S. W. Todd.
SANTA MARIA—Santa Maria Gas & Power Co.
M.—R. E. Easton; S.—L. F. Chandler.✚
SUISUN—Rochester Oil Co.
M.—J. R. Chadbourne; E.—Ora Pitts; S.—J. B. Hopkins; N.—J. R. Chadbourne.
TAFT—Honolulu Consol. Oil Co.
S.—R. R. McGuire.✪
TAFT—West Side Gas Co.
M.—J. G. McDonald.

..... COLORADO .....

BOULDER—Federal Gas Co.—W.
M.—H. B. McClure.
CANON CITY—Canon Gas Co.—W.
G. M.-V. P.—F. B. Sweeney.✚
COLORADO SPRINGS—Colorado Springs Lt., Heat & Power Co. (130)—C. & W.
M.—J. F. Dostal; S.—D. Kennedy.
DENVER—Denver Gas & Elec. Lt. Co. (108)—C. & W.
M.—W. J. Barker; E.—N. J. Dicks; G. S.—T. O. Kennedy; S.—Geo. Wehrle✪; N.—Clare N. Stannard, H. W. Thompson.✚
FORT COLLINS—Poudre Valley Gas Co. (151)—W.
M. and N.—A. B. McKibben; S.—Geo. Grill.
GRAND JUNCTION—Grand Junction Elec., Gas & Mfg. Co.—C.
M.—J. Stewart✪; E.—R. E. Breed✪; N.—A. C. Foster.✪
GREELEY—Greeley Gas & Fuel Co.—C.
M.-N.—Paul E. Darrow✚; S.—Fred. H. Ripley.
LA JUNTA—Otero Gas Co.—O.
G. M.—J. T. Updike✚; E.—C. C. Durkee.
PUEBLO—Pueblo Gas & Fuel Co. (108)—C. & W.
M.—James M. Dailey; E.—E. V. Gmeiner✪; N.—B. H. Jardine; Sec.—O. M. Hartshorn.
ROCKY FORD—Otero Gas Co.
M.—L. F. Garlington.
TRINIDAD—Trinidad Elec. Trans. Ry. & Gas Co. (112)—C.
M.—E. C. Deal; E.—C. H. Nichols; S.—H. E. Wilby; N.—Sidney Ballinger.

..... CONNECTICUT .....

BRIDGEPORT—Bridgeport Gas Light Co.—W.
S.—Chas. M. Gerdenier; N.—Arch. Gardner.
BRISTOL—Bristol & Plainville Tramway Co.—W
M.—G E. Cockings; E.—C. R. Carlson; S.—G. L. Roberts; N.—R. K. Linsley.
DANBURY—Danbury & Bethel Gas & Elec. Lt. Co. (108)—W.
M.—C. H. Merritt; S.—G. E. Cowperthwait; N.—W. P. Gulnan.✚
DANIELSON—Danielson & Plainfield Gas & Elec. Co.—W.
G. M.—H. S. Shaw; S.—J. H. Burdick.
DERBY—Derby Gas Co.—C. & W.
S.—George E. Barlow.
EAST PORTCHESTER—United Elec. Lt. &

(Over.)

(Connecticut—Continued)

Water Co. (26)
S.—J. F. Kane.

HARTFORD—Hartford City Gas Light Co. —C. & W.
M.—E. E. Eysenbach; S.—Paul R. Buchanan; N.—H. L. Barnes.

MERIDEN—Meriden Gas Light Co.—C. & W.
G. M.—Chas. A. Learned; S. of Wks.—J. L. Goodwill; S. of Dist.—C. S. Griswold; N.—I. D. Fowler.

MIDDLETOWN—Middletown Gas Light Co.—W.
Sec.—H. L. Mansfield; S.—E. C. Weston.

NEW BRITAIN—New Britain Gas Light Co. —C & W
M.—H. T. Sloper; S.—H. M. Bell; N.—H. F. Hodge.

NEW HARTFORD—New Hartford Gas Co.—W
Aaron H. Watson, Lessee✢; S.—J. Albert.✪

NEW HAVEN—New Haven Gas Light Co.—C & W
M.—J. Arnold Norcross; E.—Robert E. Wyant; N.—Alfred R. Burr; Ind. E.—Chas. A. Drum.

NEW LONDON—Conn. Power Co. (74)—W
L. M.—V. E. Bird.

NORWALK—United Elec. Lt. & Wtr. Co.—C. & W.
S.—B. H. Gardner.

NORWICH—City of Norwich, Gas & Elec. Dept.—C & W
M.—Stephen J. Kehoe; E.—R. B. Mather; I.—Jos. Sheridan.

PUTNAM—Putnam Lt. & Power Co.—W
M.—Ralph E. Thurston; E.—Adelore Dupre; S.—John B. Daigle.

ROCKVILLE—Rockville Gas & Elec. Co.—W.
M.—M. J. Warner; N.—M. J. Cullen; S.—David Loree✢ (Willimantic).

SOUTH MANCHESTER—South Manchester Lt., Power & Tramway Co.—C.
M.—Frank Cheney, Jr.; S.—F. H. Parker.

STAMFORD—Stamford Gas & Elec. Co.—W
M.—A. W. Dater; S.—G. B. Leland.

THOMPSONVILLE—Northern Conn. Lt. & Pr. Co.—W.
M.—Walter P. Schwabe.

TORRINGTON—Torrington Elec. Light Co. —W.
M.—C. E. Smith; E.—A. J. Breckenridge.

WALLINGFORD—Wallingford Gas Lt. Co. —W
M.—E. M. Addis.

WATERBURY—United Elec. Lt. & Water Co. —W.
M.—A. J. Campbell; E.—D. B. Neth; S.—W. T. Pratt; N.—B. H. Gardner.

WATERTOWN—Watertown Gas Co.
M.—E. H. Williams.✪

WILLIMANTIC—Willimantic Gas & Elec Co. —C
S.—David Loree; N.—Thos. Burnes.✪

WINSTED—Winsted Gas Co.—W
M.—H. Skinner.

DELAWARE

DOVER—Dover Gas Light Co.—W
M.-N.—Du Pont Walker; E.—T. M. Stewart✪; S.—A. B. Richardson.✢

GEORGETOWN—Georgetown Gas Co.—C
M.—L. L. Layton; E.—Jos. G. Green.

LEWES—Lewes Gas Co.
G. M.—G. E. Hudson; E.—Howard Aikins✪; S.—F. M. Williams.

SEAFORD—Sussex Gas Co.—W
M.—Henry M. Tracy✢; S.—F. A. Mullin; E.—H. Lawrence.

WILMINGTON—Wilmington Gas Co. (148) —W
M.—W. J. McCorkindale; N.—W. A. Morris; S.—Thos. F. Curley.

DISTRICT OF COLUMBIA

GEORGETOWN—Georgetown Gas Co.
Bought by Washington Gas Lt. Co. and will be merged soon.

WASHINGTON—Washington Gas Lt. Co.—C.
Pres.—H. S. Reeside; Sec.—Wm. B. Orme✢; E.—Jas. S. McIlhenny; S.—T. B. Hopper✪ and T. S. Tincher✪; N.—H. G. Reed.

FLORIDA

DAYTONA—Daytona Public Service Co.
N.—J. C. Lyle.

DELAND—Citizens Mfg. Co. (72)—W
M.—J. Frank Alldis.

GAINESVILLE—Co-operative Ice Mfg. Co.—W.
M.—G. B. Hart; E.—B. F. Gardiner.

JACKSONVILLE—Jacksonville Gas Co. (31) —C & W
M.—Harry B. Hoyt; S.—H. G. Vesey; N.—A. H. Rumbold.✪

KEY WEST—Key West Gas Co. (159)—W
M.——M. F. Sands; E.—H. L. Sands✪; N.—Roy Fulford.✪

MIAMI—Miami Gas Co.
Pres.-M.-S.—H. G. Van Court; E.—L. E. Mikaits; N.—W. C. Roome.

MIAMI BEACH—Miami Beach Gas Co.✪
Pres.—H. M. Van Court; Frank B. Shutts.

NEW SMYRNA—New Smyrna Public Service Co.
M.—J. C. Lyle.

OCALA—Ocala Gas Co. (97)—W.
G. M.—J. D. Wilkes✪; S.—J. G. Long.

ORLANDO—Orlando Water & Light Co.—W
G. M.—D. A. Chenev; S.—A. L. Kivet.

PALATKA—Palatka Pub. Service.—W
M.—R. E. L. Mann✪; S.—C. B. Marvin.

PALM BEACH—Florida Utilities Co. (97).
G. M.—J. D. Wilkes✪; S.—J. A. Donaway.✪

PENSACOLA—Pensacola Gas Co. (100)—W
S.—C. F. Zeek.

ST. AUGUSTINE—St. Augustine Gas & Elec. Lt. Co. (100)—W
S.—Chas. L. Lyon.

ST. PETERSBURG—Municipal Gas Plant—W
S. Gas Dept.—John Perkerson.

SANFORD—Sanford Light & Fuel Co. (28)—W
L. M.—F. D. Rines; Pres.—C. I. Day; Sec.-Treas.—F. G. Whitney; both of Southern Utilities Co., Jacksonville, Fla.

TALLAHASSEE—Board of Public Works. —C

(Florida—Continued)

S.—D. R. Swing.

TAMPA—Tampa Gas Co. (150)—W
M.—Roscoe Nettles; S.—David Gallagher; N.—Conrad Fabian.✪

WEST PALM BEACH—Florida Utilities Gas Co. (97).
G. M.—J. D. Wilkes✪; S.—J. A. Donaway.

GEORGIA

ALBANY—Albany Gas Wks. (Municipal).—W
S.—N. F. Tift; I.—L. J. Von Weller.

AMERICUS—Americus Lighting Co.—C.
M.—J. E. Johnson.

ATHENS—Athens Gas, Lt. & Fuel Co. (150) —C
M. and N.—Rodney C. Wilson; S.—Geo. W Joiner.

ATLANTA—Atlanta Gas Light Co.—C & W
M.—R. C. Congdon; S.—A. D. Whittaker; S. of Dis.—C. J. Weinmeister; S. M.—W. R. Collier; N.—I. H. Morehead; C. A. Werber.✢

ATLANTA—Suburban G. & E. C.—C. & W.
M.—W. R. Collier; S.—Frank McMaster (Decatur, Ga.); W. H. Smaw.✢

AUGUSTA—Gas Light Co. of Augusta (192) —W
M.—F. L. Marshall; N.—E. D. Brewer.✪

BRUNSWICK—Mutual Light & Water Co. —C
M.—A. Fendig; S.—J. G. Harvey.

CARTERSVILLE—Cartersville Gas Co.—C
M.—Mayor Paul Gilreath✪; S.—Abram Cook.✪

COLUMBUS—Gas Light Co. of Col. (74)—C.
M.—John S. Bleecker; S.—Mac D. Dexter; N.—Thos. W. Peters.

DALTON—Municipal Gas Plant—C
S.—C. C. McCamy.

GRIFFIN—Griffin Gas, Ice & Cold Storage Co.
G. M.—B. W. Kincaid✢; S.—G. M. Lane.

LA GRANGE—La Grange Municipal Gas Plant—W.
City E.—Geo. H. Sargent✪; S.—H. W. Caudle.✪

MACON—Macon Gas Co.—C & W
G. M.—Geo. R. Horning; S.—W. W. Klyce. N.—M. A. Bowlin✪; S. W. Hatfield.✢

ROME—Rome Municipal Gas Co.—C
M.—Wm. Austin✪; S.—Daniel Carey.✪

SAVANNAH—Savannah Gas Co. (160)—W
M.—Jno. W. Golden; N.—E. A. McCarthy

VALDOSTA—Valdosta Gas Co.—C
M.—J. H. Hagerty; S.—Chas. Hagerty; N. P. Lamar.

WAYCROSS—Consumers Gas Co. (79)—C.
M.—Harry D. Wilson; S.—David S. Long; N.—A. F. Timerlake.

IDAHO

BOISE—Boise Gas Lt. & Coke Co. (84)—C
M.—Wm. Stoehr; S.—Henry Scheer✪; N.—W. S. Walker.

IDAHO FALLS—Eastern Idaho Gas Co.
M.—W. D. Wilcox.

LEWISTON—Pacific Power & Light Co. (110)
L. M.—W. M. Wood; N.—Otis Stephenson.✪

POCATELLO—Pocatello Gas & Power Co. —C
M.—H. L. Peck✪; E.—T. J. Lucas✪; S.—J. M. Aleff.

ILLINOIS

ALTON—Alton Gas & Electric Co.—C
G. M.—D. E. Parsons; G. S.—W. C. Myers; E.—A. E. England✪; S.—R. F. Allen; N.—R. C. Hardy.

AURORA—Western United Gas & Elec. Co. (27)—C
Pres.—I. C. Copley; G. M.—Carroll Miller; A. G. M.—Wm. Willet; S. of D.—E. E. Lungren; N.—H. W. Edmund; V. P.—R. N. Strohm✢; Asst. Fur. Agt.—S. J. Ricker; Dist. M.—F. E. Robinson; Asst. D. M.—Wm. Given.

AURORA—Coal Products Mfg. Co. (See also Joliet, Ill.)
M.—Carroll Miller; S.—A. H. Harris, Jr.

BATAVIA—Western United Gas & Elec. Co.
Dist. M.—F. W. Vilven.

BEARDSTOWN—Central Illinois Public Service Co. (46✢)—C
M.—H. E. Montgomery; E.—C. L. Paullin.✪

BELVIDERE—Illinois Northern Utilities Co. —W (46✢)
E.—J. E. Harlow; S.—H. Caird; N.—C. L. Hedrick.

BLOOMINGTON—Union Gas & Electric Co (130)—W
M.—Ray Stretch✪; S.—A. Frankenberger✪; N.—J. C. Nichols.

BLUE ISLAND—Public Service Co. of Northern Ill. (48)—C
L. M.—W. J. Brown; S.—W. J. McPherson.

CAIRO—Cairo City Gas Co. (29)—C
G. S.—W. F. Crossley; S.—G. W. Light✪; N.—M. C. Whiting; H. J. Vance.✢

CANTON—Canton Gas & Elec. Co.—C
M.—E. H. Negley; E.—R. Donaldson; N.—C. D. Ingersoll.

CARLINVILLE—Madison Co. Lt. & Pr. Co. (29)—C
M.—E. D. Bell; S.—C. T. Wheat.

CENTRALIA—Centralia Gas & Elec. Co.—C
G. M.—H. C. Higgins; E.—Floyd Schooley; N.—George A. Price.

CHAMPAIGN—Urbana & Champaign Ry., Gas & Elec. Co. (29)—C & W
G. S.—H. J. Pepper; E.—E. S. Hight✪; S.—E. K. Demlow; N.—T. J. Condon✪; I.—W. C. Edmiston.✪

CHARLESTON—Central Illinois Pub. Service Co. (46✢)—C
S.—H. Hayworth.

CHICAGO—Peoples' Gas Light & Coke Co.—W
Chairman of Board—Samuel Insull; Pres.—E. G. Cowdery; V. P.—N. J. E. Ward; V. P. & E.—John Williamson; Sec.—L. A. Wiley; Treas.—W. S. McCrea; E.—J. H. Eustace; Asst. E.—F. B. Luther; N.—O. T. Knight; W. C. Pyle.✪✢

CHICAGO HEIGHTS—Chicago Heights Gas Co.—W
M.—J. F. Small✪; S.—A. C. Brooks.✪

CLINTON—Clinton Gas & Elec. Co. (29)—C.
M.—Chas. A. Cline; E.—Clare Smith.

(Illinois—Continued)

DANVILLE—Danville St. Ry. & Lt. Co. (29✢)—C & W
M.—J. E. Johnson; E.—F. W. Bedard; S.—W. A. Mires; N.—V. W. Kennedy.

DECATUR—Decatur Ry. & Light Co. (29)—C & W
G.-S.—M. L. Harry; Gas S.—H. J. Klotz; N.—W. D. Moore; H. J. Vance, Peoria.

DE KALB—Illinois Northern Utilities Co. (46✢)—C

DIXON—Illinois Northern Utilities Co. (46✢) —C
V. P.-G. M.—E. D. Alexander✢; E.—L. G. Adams✪; N.—C. B. Yonts; S. M.—G. H. Ludeking.

DU QUOIN—Du Quoin Lt., Heat & Pr. Co. (27)—C
D. M.—C. L. Farrar✪; N.—W. E. Baker.

EAST ST. LOUIS—St. Clair County Gas & Elec. Co. (142)—W
M.—C. H. Quackenbush; E.—I. Grettum; S.—J. A. Siepker✪; N.—W. T. Schutt; I.—Geo. Barber.✪

ELGIN—Western United G. & E. Co. (27)—C.
Dist. M.—C. B. Strohn; S.—J. H. Owens.

EVANSTON—Public Service Co. of Northern Illinois (48)—W
S.—W. P. Crowley; N.—Fred Steele.

FREEPORT—Freeport Gas Co. (148)—C & W
M.—E. D. V. Dickey✢; S.—Earl Smith.

GALENA—Gas Light Co.—C
G. M.—E. C. Deal; S.—C. C. Dunlap✢; E.—Geo. Bell.

GALESBURG—Galesburg Ry., Lighting & Pr. Co. ((29)—C
M.—R. F. Carley; E.—F. W. Bedard; N.—W. A. Rothgeb; H. J. Vance, Peoria.✢

GALVA—Consolidated Light & Pr. Co. (142).
M.—H. M. Smith; S. and N.—Thos. F. Gannon; N.—I. H. Fink.✪

GENESEO—Illinois Northern Utilities Co. (46✢)—W
L. S.—L. R. Kallman.✪

GRANITE CITY—Granite City Gas, Lt. & Fuel Co.—C & W
M.—C. H. West; S.—A. Finnegan; N.—Jos. E. McGraw.

GREENVILLE—Southern Ill. Lt. & Pr. Co. (89)—W
Sec.—C. A. Ramsey.

HIGHLAND PARK—North Shore Gas Co.—C
Dist. M.—F. E. Keuper.

HILLSBORO—Southern Illinois Lt. & Pr. Co. (89)—W
G. S.—W. F. Cori; M.—A. T. Early; E.—J. L. Best; N.—F. P. Williams

HOOPESTON—Hoopeston Gas & Elec. Co. (88)—W.
M.—Curtis Duke✪; W. G. Austin.✪

JACKSONVILLE—Jacksonville Ry. & Lt. Co. (29)—C & W
S.—E. H. Gray; S.—S. McCune✪; N.—H. C. Bradish; I.—E. C. Edminston.✪

JOLIET—Coal Products Mfg. Co.
(Owned by Western United G. & E. Co., Aurora, Ill.)
M.—Carroll Miller; S.—Alan H. Harris, Jr.

JOLIET—Western United G. & E. Co. (27)—C
Dist. M.—C. I. Carlson; N.—Floyd E. Turner.✪

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KANKAKEE—Pub. Service Co. of Northern Ill. (48)—C —C.
S.—B. G. Smith; N.—Fred. Steahling.

KEWANEE—Consolidated Lt. & Pr. Co. (142).
L. M.—H. M. Smith; N.—I. Harold Fink; I.—Harry T. Wolfe.

LAKE FOREST—North Shore Gas Co.
Dist. M.—E. V. Irwin.

LA SALLE—Citizens' Lighting Co. (29)—C
S.—L. W. Hess; N.—W. Schriner.✪

LAWRENCEVILLE—Illinois Gas Co.
M.—J. A. Sloan.

LIBERTYVILLE—North Shore Gas Co.
Dist. M.—A. C. Murray.

LINCOLN—Logan Co. Gas Co.—C
M.—Chas. S. Morgan.✢

LITCHFIELD—Southern Ill. Lt. & Pr. Co. (89)—O.
M.—D. Davis✪; L. Sharer✪; I.—Edw. Berkowitz. (Hdqurs: Central National Bank Bldg., St. Louis, Mo.)

MACOMB—Central Illinois Public Service Co. (46✢)—W
E.—C. L. Paullin; S.—A. H. Ferris.✪

MARION—Southern Ill. Gas. Co. (27)—W.
D. M.—H. L. Farrar; S. D.—O. L. Crouch; E.—E. J. Stephany; S. J. Ricker, Aurora.✢

MATTOON—Mattoon Gas Light & Coke Co.
S. and N.—R. L. Fickes; E.—C. L. Paullin; Plant S.—Geo. Arnold; S'mn—J. F. Stevens.

MENDOTA—Illinois Northern Utilities Co. (46✢)
M.—C. W. Tennant✪; S.—S. Moss✪; N.—W. T. Brachen.✪

MOLINE—Peoples' Power Co. (88).—W.
G. M.—R. B. McDonald✪; S. P.—O. Nygaards; S. D.—E. A. Cornell; Gen. G. Kuhn✢. N.—W. F. Hanagan.

MONMOUTH—Monmouth Public Service Co. (90)—W
M.—J. R. Stevenson.

MORRIS—Public Service Co. of Northern Ill. (48)—C
S.—James A. Schabeck; N.—J. Riley.

MORRISON—Illinois Northern Utilities Co. (46✢)—W
L. M.—D. Gallagher.

MT. CARMEL—Mt. Carmel Public Utility & Service Co.—W
M.—P. Barnhard✢; E.—E. L. Wilson✪; S.—A. D. Hill.

MOUNT VERNON—Citizens' Gas, Elec. & Heating Co. (89)—C
M.—Frank M. Stone; S.—Sherman Allen; N.—George Bulach; W. W. Burton✢, 905 Central National Bank Bldg., St. Louis, Mo.

MURPHYSBORO—Murphysboro W. W. Elec. & Gas Lt. Co. (27)—W
M.—Carroll Miller, Aurora, Ill.; S. G. M.—

(Maryland—Continued)

BALTIMORE—Consolidated Gas, Elec. Lt. & Power Co.—W.
M.—Charles M. Cohn, V.-P.; E.—George Peadenkopf; N.—R. H. Tillman; S. M.—Herbert K. Dodson; I.—Thomson King; Andrew Banks, Jr.✠

CAMBRIDGE—Cambridge Gas, Electric Light & Power Co. (147)—C
S.—F. W. Woodcock✪; N.—S. E. Matthews.

CHESTERTOWN—Chestertown Gas Co.—W
M.—Albert Pharo✠; S.—Paul N. Adams.✪

CRISFIELD—Crisfield Lt. & Pr. Co.—W
M.—Walton Owens✪; E., S. & N.—R. G. Anklam.✠

EASTON—Easton Light & Fuel Co.—W
S.—A. W. Porter.

ELKTON—Elkton Gas Co.—C
M.—Jos. H. Perkins; S.—Robt. Perkins.

FREDERICK—Frederick Gas & Elec. Co.—W
M.—M. A. Pooler✪; E.—W. H. Steinhouse; N.—F. J. Schroeder.

HAGERSTOWN—Hagerstown Lt. & Heat Co. (131)—W
M.—W. R. Rhoades; E.—Albert Heard✪; S.—E. B. Speilman; N.—F. J. Bullard.✠

HAVRE DE GRACE—Havre de Grace Gas Co.—W
M.—C. M. Keebler.

HYATTSVILLE—Hyattsville G. & E. Co.—C.
S.—E. G. Bucklin.

SALISBURY—Salisbury Lt., Ht. & Pr. Co. (147)—W
G. S.—F. W. Woodcock✪; Aud.—C. O. Culver.✪

TAKOMA PARK—Washington Gas Lt. Co.✠
Geo. M. Whitwell.

WESTMINSTER—Consolidated Public Utilities Co.—C
M.—Frank A. Myers.

—Natural Gas Companies—

CUMBERLAND—W. Va. & Md. Gas Co.
S.—J. C. Cunningham.

OAKLAND—Northern Natural Gas Co. (102)
M.—H. V. Thomas; S.—J. B. Cheuvront; F. D. Tracy.✠

..... MASSACHUSETTS. .....

ADAMS—Adams Gas Light Co. (72)—C & W
S.—Benjamin K. Cook; N.—Wm. Gould.

AMESBURY—Amesbury & Salisbury Gas Co.—W
M.—Jno. G. McCarthy.✪

AMHERST—Amherst Gas Co.—W
M.—Geo. W. Lawrence; E.—B. F. Brown✪; S. and N.—J. J. O'Connell; G. E. Rogers.✠

ARLINGTON—Arlington Gas Light Co. (72)—C & W
Bus. M.—F. A. Woodhead.

ATHOL—Athol Gas & Elec. Co. (68)—W
L. M.—A. A. Laughton✠; E.—R. H. Jameson; N.—A. W. Evans.

ATTLEBORO—Attleboro Gas Light Co.—C
M.—W. J. Luther.

BEVERLY—Beverly Gas & Elec Co.—C & W
M.—A. W. Rogers; E. & S.—C. R. Pritchard; N.—C. B. Hodgson.

BLACKSTONE—Blackstone Gas & Elec. Co.
S.—R. O. Ditson.

BOSTON—Boston Consolidated Gas Co. (70)—C & W
Pres.—W. A. Wood; V. P.—E. N. Wrightington; V. P.—D. D Barnum; Sec.—H. S. Lyons; Treas.—R. Grant; E. Dist.—J A. Gould; E. Const.—H. N. Cheney; N. Jno. C. D. Clark; Albert Dunbar✠; I.—W. W. Cummings; M. Appl. Dep.—Henry Allen.

BOSTON—East Boston Gas Co. (70)—C & W
G. M.—Nathaniel W. Gifford; N.—J. M. Riley; Albert Dunbar.✠

BOSTON—New England F'l & Tr. Co. (70)
Gen. M.—W. E. McKay; S.—R. M. Folsom; Albert Dunbar.✠

BROCKTON—Brockton Gas Light Co.—W
G. M.—Geo. H. Priest; Asst. M.—J. B. Anderson; J. F. Garvin.✠

CAMBRIDGE—Cambridge Gas Light Co.—C & W
M.—Albert M. Barnes; E.—John P. Kennedy; N.—Wm. L. King.

CHARLESTOWN—Charlestown Gas & Elec. Co.—C
M.—S. J. Fowler; S.—P. Coyle.✪

CLINTON—Clinton Gas Light Co. (72)—W
L. S.—R. E. Freel.

DANVERS—Beverly Gas & Elec. Co.
S.—S. E. Gillette.

EAST BRAINTREE—Old Colony Gas Co.—W
M.-N.—Geo. P. Smith, Jr.; J. D. Shattuck (Phila.); S. of W.—Ralph Gardner; I.—C. D. Bond.

EASTHAMPTON—Easthampton Gas Co.—C
M.—Geo. W. Lawrence✪; E.—F. L. Hunt✪; S.—John N. Lyman.✠

EVERETT—New England Gas & Coke Co. (70). (See Boston.)—C
Asst. S.—Howell Fisher; Dist. S.—J. I. Wing.

FALL RIVER—Fall River Gas Works Co. (74)—C & W
M.—Joseph E. Nute; S. of Wks.—R. B. Clark; N.—R. Buckminster.

FITCHBURG—Fitchburg Gas & Elec. Light Co. (76)—C & W
M.—C. R. Hayes; E.—C. H. Tenney & Co. (Boston); S.—G. W. Stiles; N.—F. S. Clifford; I.—L. B. Crossman.

FRAMINGHAM—Framingham Gas, Fuel & Power Co.—W
M.—F. W. Jennings; E.—Wm. F. Driscoll; N.—R. R. Hathaway.

GARDNER—Gardner Gas, Fuel & Light C. —W
L. M.—A. A. Laughton.

GLOUCESTER—Gloucester Gas Light Co. (72)—C & W
M.—Wm. H. Coffin; E.—J. L. Strople✪; S.—Geo. Alden.

(Massachusetts—Continued)

N.—J. W. Christian.

HOLYOKE—Holyoke Gas & Elec. Dept. (Municipal.)—C & W
M.—John J. Kirkpatrick✠; S.—O. W. Adams.

HYDE PARK—Dedham & Hyde Park Gas & Elec. Lt. Co.—C & W
S.—Benj. J. Bean.

IPSWICH—Ipswich Gas Light Co.—C
M.—C. W. Brown.✠

LAWRENCE—Lawrence Gas Co.—C & W
V. P. and M.—C. J. R. Humphreys; E.—F. H. Sargent✪; S.—H. G. Taylor✪ and R. J. Humphreys.✪

LEOMINSTER—Leominster Gas Light Co. (72)—W
M.—J. I. Matthias.

LEXINGTON—Lexington Gas Co. (72)
M.—F. A. Woodhead.

LOWELL—Lowell Gas Light Co.—C & W
M.—G. S. Motley✠; S.—A. J. Flanders; N.—G. Escherman.✪

LYNN—Lynn Gas & Elec. Co.—C & W
G. M.—H. K Morrison; E.—F. E. Drake✪; N.—E. W. Allen.✪

MALDEN—Malden & Melrose Gas Lt. Co. (76)—C & W
M.—C. E. Paige; S.—R. S. Carter; N.—C. Barnes; F. P. Mooney.✠
✪ ✪ ✪

MARLBORO—Marlboro-Hudson Gas Co. (68)—W.
M.—Chester A. Davis; S. and N.—E. F. Goggin; I.—R. H. Jameson; M. B. Webber, 78 Devonshire St., Boston.✠

MIDDLEBORO—Middleboro Gas & Elec. Plant.—W
M.—Geo. A. Philbrook.✠

MILFORD—Milford Gas Light Co. (72)—C
S.—W. H. Leonard.

NANTUCKET—Citizens Gas, Elec. & Power Co.—W
S.-N.—H. P. Halvorsen.

NATICK—Natick Gas Light Co.—C
S.—L. J. Dobbin.

NEW BEDFORD—New Bedford Gas & Edison Lt. Co.—C & W
G. M.—W. H. Snow; Asst. M.—Luther M. Pease; S. of Gas Mfre.—Robt. Lindsay; N.—E. E. Stevens.

NEWBURYPORT—Newburyport Gas & Elec. Co.—C
E.—David Barry; S.—C. S. Spaulding; N.—F. C. Kidde.✪

NEWTON—Newton & Watertown Gas Lt. Co. (70)—C & W
M.—Waldo A. Learned✠; N.—R. A. Fancy.

NORTH ADAMS—North Adams Gas Lt. Co. (72)—C & W
M.—B. K. Cook; E.—A. H. Mahy; S. D.—James Coates.

NORTHAMPTON—Northampton Gas Light Co. (72)—C & W
M.—C. B. Day; S.—G. B. Lawrence.

NORTH ATTLEBORO—North Attleboro Gas Lt. Co.—C
S.—Wm. B. Knight.

NORWOOD—Norwood Gas Co.—C
G. M.—Paul B. Webber; E.—F. B. Saunders✪; N.—R. C. Champion; Salesman—J. H. Mitchell.

OAK BLUFFS—Vineyard Lighting Co.—W
M.—Chas. Carpenter✠; S.—W. L. Greenleaf.

PALMER—Worcester County Gas Co. (72)—W
Bus. M.—C. M. Durell; Asst. N.—Harry Sanborn.✪

PITTSFIELD—Pittsfield Coal Gas Co.—C & W
M.—H. C. Crafts✠; S. Wks.—D. M. Cullen, Jr.; S. of Dis.—Geo. R. Nixon.✪

PLYMOUTH—Plymouth Gas Light Co.—C
M.—Eugene P. Rowell; S. & N.—John L. Murray.

QUINCY—Citizens Gas Light Co. (70)—C & W
M.—W. B. Nichols✠; N.—J. W. Muir✪; I.—H. Howard Smith.✪

REVERE—Suburban Gas & Elec. Co. (76)—C & W
M.—C. F. Chisholm; E.—R. J. Smith; S.—A. F. Gardella; N.—H. M. Frank.

SALEM—Salem Gas Light Co.—C & W
M.—J. L. Tudbury; N.—T. I. Fenno.✪

SPENCER—Spencer Gas Co. (72)—W
M.—C. M. Durell.

SPRINGFIELD—Springfield Gas Light Co. (76)—C & W
M.—W. H. Bradley; E.—F. C. Sargent, S.—Arthur S. Hall; N.—John S. Fox; I.—E. A. Bliss✪; F. L. Belcher.✠

STONEHAM—Malden & Melrose Gas Light Co.—C & W
S.—E. R. MacCarthy.

STOUGHTON—Brockton Gas. Lt. Co.

TAUNTON—Taunton Gas Light Co.—C
M.—Walter Soper✠; S.—Ralph E. Fish.

WAKEFIELD—Wakefield Municipal Light Plant.—C & W
M.—S. L. Cole.✠

WARE—Ware Gas Light Co.—C
S.—George E. Tucker.✠

WEBSTER—Webster & Southbridge Gas & Elec. Co.—W
S.—H. S. Shaw; Chf. E.—W. E. Clay; S.—A. E. Shaw; N.—C. W. Flagg.

WESTFIELD—Westfield Gas & Elec. Works.—C
M.—Guy E. Mitchell✠; S. of M.—W. T. Lincoln.

WEYMOUTH—Old Colony Gas Co. (See Braintree.)

WILLIAMSTOWN—Williamstown Gas Co. (72)

..... MICHIGAN. .....

ADRIAN—Lenawee County Gas & Elec. Co (40)—C & W
M.—F. A. Lane; Pres.—I. C. Elston, Jr. (Chicago).

ALBION—Albion Gas Light Co. (84)—C
M.—G. W. Briggs.

ALLEGAN—Allegan County Gas Co. (83)—C
L. M.—Gus. Butler. (See Otsego.).

ALMA—Gratiot County Gas Co. (79)—W
S.—Chas. Mathis; E.—R. B. Wagner, Saginaw, Mich.✠

ALPENA—Alpena Gas Co.—C
G. M.—L. N. Young✪; S.—I. R. Hutchinson.✪

ANN ARBOR—Washtenaw Gas Co.—C
M.—H. W. Douglass; E.—Chas. R. Henderson; S.—F. Hochrein; N.—E. E. Gwinner.

BATTLE CREEK—Calhoun Gas Co.—C & W
M.—F. W. Seymour✪; S.—F. G. Remington; N.—W. O. Weeks.

BAY CITY—Michigan Light Co. (87-116)—C
M.—S. Ball; S.—Wm. Jones; N.—Walt McMullen.

BELDING—Belding Gas Works.—C
M.—L. A. Leonard✠; S.—H. J. Leonard.

BENTON HARBOR—Benton Harbor-St. Joseph Gas & Fuel Co. (32)—W
M.—E. C. Campbell; S.—H. B. Hummel; N.—H. J. Campbell.✪

BIG RAPIDS—Big Rapids Gas Co.—C
M.—R. Shacklette; E.—B. O. Tippy; S.—C. Shust; N.—W. B. Dye.✪

CADILLAC—Cadillac Gas Light Co. (86)—C
M.—Henry F. Donahue.✠

CHARLOTTE—New Charlotte Gas Co.—C
M.—J. W. Sawyer.✠

CHEBOYGAN—Cheboygan Gas Light Co.—C
M.—F. B. Spencer✠; S.—H. M. Milliken.

COLDWATER—Coldwater Gas Lt. & Fuel Co. (78)—C
M.—Geo. C. Turner✠; E.—B. O. Tippy (Detroit); S.—C. A. Jennings; N.—Mark Dunham.

DETROIT—Detroit City Gas Co. (105)—C & W
G. M.—C. W. Bennett; E.—Jno. W. Batten; S. of M.—C. H. Stone✪; S. of D.—R. A. Jayne; N.—Richard C. Fowler; I. E.—A. A. Treadway; H. Hood.✠

DOWAGIAC—Dowagiac Lt. & Pr. Co.—C
M. & N.—G. M. White; S.—Frank Bass; I.—R. Stafford.✪

ESCANABA—City Lighting Co.—W
M.—A. T. Manley; S.—John Roemer; N.—J. Harold O'Meara.

FLINT—Michigan Light Co. (87-116) C & W
M.—F. A. Beard; S. of D.—E. F. Hutchins; N.—W. A. Hastings.

GRAND HAVEN—Grand Haven Gas Co. (78)—C
M.—R. D. Hubbard; S.—F. D. McFadden; N.—H. M. Hollenbeck.

GRAND LEDGE—Grand Ledge Gas Co.—C
M.—Cassius Alexander.✠

GRAND RAPIDS—Grand Rapids Gas Lt. Co. (105)—C & W
M.—J. T. Young; E.—S. W. Cheney✪; S. of Dist.—John Hellen; S. of Mfg.—J. E. Spindle✪; N.—G. R. Chamberlain; S. M.—Guy Halladay✪; A. G. Schroeder.✠

HANCOCK—Houghton County Gas & Coke Co.—C & W
M.—J. L. West✪; N.—A. J. Wyness.✪

HASTINGS—Thornapple Gas & Elec. Co. (132)—C & W
M.—H. H. Mason; E.—Frank Kelly; S.—G. H. Briggs; N.—Glenn Brower.

HILLSDALE—Hillsdale Gas Light Co. (78)—C
M.—R. Wiseman✠; E.—B. O. Tippy (Detroit).

HOLLAND—Holland City Gas Co. (84)—C
M.—Emery P. Davis.

IONIA—Ionia Gas Light & Coke Co.—C
M.—E. F. Gallagher✠; S.—Wm. Whitlock.✪

IRON MOUNTAIN—Iron Mountain Lt. & Fuel Co. (135)—W
M.—J. E. Sahlin.✪

IRONWOOD—Ironwood Gas Co. (135)—W
S.—Oscar Johnson.

ISHPEMING—Marquette County Gas & El. Co.—C (See also Negaunee.)
G. S.—J. D. McDougall; E.—R. S. Wilhelm; N.—W. F. Bealle.

ITHACA—Gratiot County Gas Co. (See Alma.)

JACKSON—Michigan Light Co. (116)—C & W
G. M.—C. W. Tippy; E.—J. A. Brown; M.—B. R. Laraway; S.—S. C. Page; P. O. Belcher.✠

KALAMAZOO—Michigan Light Co. (87-116) C
M.—F. W. Blowers✠; E.—W. H. Barthold; S.—C. A. Barthold; N.—Wm. Hellen.

LANSING—Lansing Fuel & Gas Co. (148)—C & W
M.—Clark R. Graves; S.—L. B. Rogers; Sec. & N.—Lee Chamberlain.

LAURIUM—Calumet Gas & Coke Co.—C & W
G. M.—Gene Bandetinni✪ N.—A. P. Eva.

LUDINGTON—Ludington Gas Co.—C & W
Pres.—C. N. Remington, Grand Rapids, Mich.✠; S.—J. L. Boone.

MANISTEE—Michigan Light Co. (87-116)—W
M.—C. S. Kressler; E.—Ernest Zellar✪; N.—C. R. Taber.

MARQUETTE—Marquette Gas Lt. Co.—C & W

MARSHALL—Marshall Gas Light Co.—C
M.—Carroll Collins.✠

MENOMINEE—Menominee & Marinette Lt. & Trac. Co.
M.—Edward Daniell; S.—J. B. Shickel; N.—Edw. A. Golden; A. W. Raisbe.✠

(Michigan—Continued)

M.—R. I. Speer; E.—J. C. Markley (Chicago); S.—Jos. Foulds.

MT. PLEASANT—Central Gas Co.—C
M.—N. J. Brown✠; E.—E. M. Jefferson; N.—W. B. Brown.

MUSKEGON—Muskegon Traction & Lighting Co. (105)—C & W
G. S.—W. L. Eyke; N.—P. Buckley; H. S. Nelson.✠

MUSKEGON HEIGHTS—Muskegon Heights Gas Co.
M.—R. G. McPherson; E.—C. Solathe; S.—A. E. Dunn.

NEGAUNEE—Michigan Gas & Elec Co. (46)—C
(See Ishpeming, Mich.)

NILES—Niles Gas Light Co. (152)—C
S.—T. M. Swain.

OTSEGO—Allegan County Gas Co. (83)—C
M.—R. C. Beebe.✠

OWOSSO—Owosso Gas Light Co.—C
M.—A. T. Birk.✠

PETOSKEY—Petoskey & Bay Shore Gas Co.—C
M.—Norman W. Wells.✠

PLYMOUTH—Plymouth & Northville Gas Co.—C
M.—C. A. Fox; S.—John J. Rowe.

PONTIAC—Michigan Light Co. (87-116)—C
M.—Fred A. Tippy✪; S.—E. D. Merry; N.—Elmer Reynolds.

PORT HURON—Port Huron Gas Co. (152)—C & W
S.—B. J. Crahan; S. and N.—Frank J. E. O'Hara.

ST. JOHNS—Mutual Gas Co.—W
M.—E. L. Dooling✠; S.—Fred Bowles.

SAGINAW—Michigan Light Co. (87-116)—C & W
M.—J. A. Cleveland✪; S.—Wm. T. Ward✪; I.—H. E. Broughton.✪

SAULT STE. MARIE—Sault Ste. Marie Gas & Elec. Co.—C
M.—Jas. Trimble✠; E.—P. C. Williams; N.—Geo. H. Spence.

SOUTH HAVEN—South Haven Gas Co. (83)—C
M.—John Hildebrand; E.—W. D. Birbeck; S.—Jas. Horner.

STURGIS—Sturgis Gas Co. (83)—C
M.—D. M. McCallister; E.—W. D. Birbeck.

THREE RIVERS—Mich. Gas & Elec. Co. (46)
M.—Paul B. Simmons

TRAVERSE CITY—Traverse City Gas Co.—C
M.—W. S. Cook.

YPSILANTI—Municipal Gas Co.—(C & W)
M.—W. R. Caldwell.

ZEELAND—Ottawa County Gas Co. (84)
M.—E. P. Davis.

..... MINNESOTA. .....

ADAMS—City Gas Wks. Co.✪
S.—Jas. J. Rogers.✪

ALBERT LEA—Minnesota Gas & Elec. Co.—W
M.—H. L. Nichols✪; E.—F. Squires.

AUSTIN—Austin Gas Co.—W
Pres.—Z. T. F. Runner✠; S.—W. H. Martell.

BEMIDJI—Bemidji Gas Co.✪ (80)
M.—D. A. Frerichs✪; E.—A. P. Allard✪; S.—Wm. Nelson.✪

BRAINERD—Brainerd Gas & Elec. Co.—W
M.—Jerome Spiering.

CROOKSTON—Crookston Gas Co.—W
M.—R. L. Spiering.

DULUTH—Water & Light Dept.—C
M.—D. A. Reed; Asst. M.—Geo. L. Gross✠; E.—H. G. Fisher✪; S.—D. Keefe.

DULUTH—Zenith Furnace Co.—C
M.—C. W. Andrews; S.—J. C. Harris; N.—J. S. Hassan.

EVELETH—Northern Utilities Co. (81)—W

EXCELSIOR—Excelsior Gas Co.—O
M.—C. F. Wheeler.✠

FARIBAULT—Consumers Power Co. (34)—C
M.—B. W. Cowperthwait; S.—Edw. Choppine; N.—W. R. Pearce.

HIBBING—Municipal Gas Plant.✪

HOPKINS—Municipal Gas Plant.
M.—G. W. Moore.

JASPER—Jasper Gas Works—W
M.—Anton Knutson.

MANKATO—No. States Pr Co. (34)—C
M.—R. E. Brown; E.—O. Anderson; S.—H. M. Hoffman; N.—O. T. McLean; I.—H. Daniels.

MINNEAPOLIS—Minneapolis Gas Light Co.—C & W
Sec.—W. H. Levings; S.—F. C. Shepard; N.—L. F. Blyler; A. H. Rand.✠

NEW ULM—New Ulm Gas Co.—W
M.—J. A. Kennedy✪; E.—Paul Borchert✪; N.—C. R. Hennick.

OWATONNA—Public Service Operating Co.—W
M.—M. J. Brown✠; N.—C. C. Dale.

RED WING—Wis.-Minn. Lt. & Pr. Co. (84)—C & W
M.—D. J. Fleming.

RENVILLE—Renville Gas Plant (Municipal)—W
M.—John Clausen.

ROCHESTER—Rochester Light, Heat & Power Co. (83)—C & W
M. and E.—C. H. Morrish; S.—Herman Briese.

ST. CLOUD—Public Service Co. of St. Cloud.
Pres.—A. G. Whitney; E.—Geo. Marvin✪; S.—H. Vierig✪; N.—A. M. Gaddis.✪
Also owns new plant at Brainerd, Minn.

ST. PAUL—St. Paul Gas Light Co. (105)—C & W
M.—Paul Doty; A. G. M.—F. L. Cross✪; S. of Wks.—D. W. Flowers; S. Dis.—B. F. Pelton; N.—Geo. Steinwedell; F. C. Hoffman.✠

STILLWATER—Northern States Pr. Co. (34)—C
M.—B. O. Lund; S.—C. J. Clarey.✪

VIRGINIA—Water & Light Dept.—W
M.—C. T. Harding✠; E.—Paul Vidler; S.—

(Minnesota—Continued)

C. T. Harding✪; N.—F. P. Johnston.

WEST MINNEAPOLIS—West Minneapolis Gas Works.—W
S.—Axel Olson; N.—J. O. Harrison.✪

WINONA—Wis.-Minn. Lt. & Pwr. Co. (84)—C
M.-I.—W. F. Clausen; N.—Max Meschka.

..... MISSISSIPPI. .....

BILOXI—Gulf Coast Gas Co.—W
M.—D. G. Skinner✪; E.—A. F. Kersting; S.—W. M. Bagot; N.—W. W. Baltar, Jr.

COLUMBUS—Columbus Ry, Lt. & Power Co.—C
M.—Chas. Hays✠; S.—H. W. McCanns.✪

GREENVILLE—Greenville Gas & Coke Co.
M.—E. H. Collins✪; S.—C. W. Nicholson.✪

HATTIESBURG—Hattiesburg Traction Co.—C
M.—H. F. Wheeler✠; S.—C. G. Cargil; N.—S. C. Irby.

JACKSON—Jackson Light & Traction Co. (84)—C
M.—L. O. Gordon; S.—J. W. Browne.✪

MERIDIAN—Meridian Lt. & Ry. Co. (108)—C
M.—H. E. Brandli; E.—Chas. E. Ide✪; S.—Jas. Canterbury✪; N.—J. B. Wilson.

NATCHEZ—Southern Ry. & Lt. Co.
M.—F. J. Duffy.

VICKSBURG—Vicksburg Gas Co. (160)—C
M.—Jno. J. Gannon.

..... MISSOURI. .....

BOONVILLE—Boonville Lt. & Pr. Co. (47)—C.
M.—Geo. H. Hirschfeld; S.—Chas. Rider; N.—T. W. Long.

BROOKFIELD—Brookfield Gas, Elec. & Heating Co.—W
M.—L. D. Kelsey.

CAPE GIRARDEAU—Missouri Pub. Utilities Co. (90)—C
M.—E. A. Hart✪; N.—J. H. Wells✪; Phil Ziegenfuss.✠

CHILLICOTHE—Peoples Gas & Elec. Co. (118)—W
M.—G. M. Willis.

CLINTON—Clinton Light & Water Co.—C
M.—J. T. Marsh.✠

COLUMBIA—Columbia Gas Works.
Pres. and Pur. Agt.—A. R. Smyth; M.—Wm. H. Watts (both of Central Nat'l Bk., St. Louis).

EXCELSIOR SPRINGS—Excelsior Springs Water, Gas & Electric Co.—W
M.—S. W. Henderson✠; E.—Geo. W. Irey; N.—V. B. Stone.

HANNIBAL—Citizens Gas Co., of Hannibal. (78)—C
M.—Thos. C. McKenzie, Jr.; S.—F. D. McFadden✪; N.—F. J. Cole.✪

INDEPENDENCE—Jackson County Light, Heat & Pr. Co. (38)—W.
M.—D. S. Milne✪✠; S.—A. M. Travis.

JEFFERSON CITY—Jefferson City Light, Heat & Pr. Co. (29)—W
G. S.—Ray Palmblade; E.—Paul M. Hart; N.—E. V. Pryor.✪

KIRKSVILLE—Kirksville Gas, Heat & Elec. Co.—W
G. M.—T. B. Anderson.

LEXINGTON—Missouri Gas & Elec. Service Co. (46)—W
M. Worth Bates✠; E.—Fred Campbell.

LOUISIANA—Louisiana Lt., Pr. & Trac. Co.—C
M.—N.—Abe Vogel✠; E.—C. C. Keeler✪; S.—Chas. Osterhold.

MACON—Macon Gas & Elec. Lt. Co.—O
S.—N. S. Thompson.✠

MARSHALL—Missouri Gas & Elec. Service Co. (46)—C
M.—C. C. Barnard✠; E.—J. F. Parks.

MEXICO—Mexico Power Co.—W
M.—E. R. Locke.

MOBERLY—Moberly Lt. & Power Co.—W
M.—H. M. Saubert; S.—Arthur Oquest; N.—F. D. McDonald.✪

NEVADA—Nevada Utilities Co. (73)
M.—J. Fred. Schaeffer; S.—D. W. Cook.✪

ST. CHARLES—St. Charles Lighting Co. (40)—C
M.—L. G. Stealy✠; Pres.—I. C. Elston (Chicago).

ST. LOUIS—Laclede Gas Light Co.—C & W
Pres. and M.—C. L. Holman✠; E.—G. R. Evans; S.—J. D. Von Maur; S. of Sta.—H. C. Wehnert; N.—J. J. Burns.

ST. LOUIS—St. Louis County Gas Co. (126)—W
G. M.—Chas. D. Ruffner; E. of M.—Geo. Hessenbruch; E. of D.—J. E. Hillemeyer; S.—S. H. Wallace; N.—L. R. Foster.✠

SEDALIA—City Lt. & Traction Co. (108)—C
M.—H. C. Feuers; E.—Raymond Niehause✪; S.—R. Niver✪; N.—W. B. Malone.

SPRINGFIELD—Springfield Gas & Elec. Co. (112)—W
E.—C. H. Nichols; S.—E. F. Hanna; N.—W. S. Hill.

TRENTON—Trenton Gas & Elec. Co. (118)—W
M.—E. A. Wright.✪

WEBSTER GROVES—St. Louis County Gas Co. (See St. Louis.)
M.—Louis H. Egan✪; E.—J. E. Hillemeyer; N.—W. Overing; I.—E. H. Lewis; L. R. Foster.✪

—Natural Gas Companies—

CARTHAGE—Carthage Gas Co. (108)
M.—B. C. Adams✪; S.—Chas. O'Neill.

JOPLIN—Joplin Gas Co. (152)
S.—John McMillan.✪

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KANSAS CITY—Kansas Natural Gas Co.
Dist. S.—T. J. Coyle; G. M.—A. B. MacBeth.

KANSAS CITY—Kansas City Gas Co. (160)
Pres.—E. L. Brundrett✠; Sec.-Treas.—J. M. Scott; E.—A. Hurlburt.

ORONOGO—Oronogo Gas Co.
M.—E. Allendorf.

ST. JOSEPH—St. Joseph Gas Co. (105)
M.—V. L. Elbert; S.—J. W. Mitchell.✠

WEBB CITY—Webb City & Cartersville Gas Co. (108)
M.—G. E. Hayler, Jr.

(Missouri—Continued

WESTON—Weston Gas & Light Co. (88)
Dist. S.—R. M. Stuntz; S. J. Mattocks (Kansas City).✠

..... MONTANA. .....

BILLINGS—Billings Gas Co.—W
M.—R. C. Cardell; N.—D. R. Barlow.

BUTTE—Montana Power Co.—C
M.-E.—F. M. Kerr; S.—Jas. E. Davidson; N.—A. Von Dachenhausen.

GREAT FALLS—Great Falls Gas Co.—W
M.—W. A. Bertke✪; N.—C. B. Hillsbury.

HELENA—Helena Lt. & Ry. Co. (132) C & W
S.—G. A. Strain✠; N.—W. R. Miles.

MISSOULA—Missoula Gas Co.—C
Pres.—Geo. P. Smith✪; E.—Ernest E. Lloyd✪; S. & N.—C. R. Young.

—Natural Gas Companies—

GLENDIVE—Glendive Gas Co.
M.—John Johns.

HAVRE—Havre Natural Gas Co.
M.—H. O. Wheeler; S.—P. E. Scott.

..... NEBRASKA. .....

ALBION—Municipal Gas Plant.—W
S.—E. Swalls.✠

BEATRICE—Gage County Gas, Lt. and Power Co. (140)—W. & C.
M.—Thos. Rice; E.—Geo. H. Harper.

BERTRAND—Bertrand Gas Wks.
Prop. & G. M.—O. A. Stephenson.

BLAIR—Blair Gas Co.—W
G. M.—Guy K. Mead.✠

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BROKEN BOW—Broken Bow Gas Co. (91)—W
M.—George Osten; E.—S. L. Bradley.

CENTRAL CITY—Central City Gas Co.—W
M.—A. W. Borden; S.—T. R. Lindley.✪

COLUMBUS—Columbus Gas Co.—W
M.—R. Y. Lisco✠; E.—Burt Collier✪; I.—O. C. Pennington.

FAIRBURY—Fairbury Gas Co.—W
M.—B. G. Dawson✠; S.—Wm. Singleton.

FREMONT—Fremont Gas, Elec. Lt. & Power Co. (108)—W
M.—A. B. Wynne✪; E.—H. E. Hoadley; S.—Chas. Gleason; N.—K. W. Graham.

GRAND ISLAND—Grand Island Gas Co.—W
(Operated by Hastings (Nebr.) Gas Co.)
S. and N.—E. H. Vieregg.

HASTINGS—Hastings Gas Co.—W
M.—A. W. Borden; S.—John Brehm; N.—C. H. Hooper.

KEARNEY—Midway Gas Co.—W
G. M.—W. J. Scoutt; S.—C. E. Pierce; N.—E. P. Strain.

LINCOLN—Lincoln Gas & Elec. Lt. Co.—(108)—W
M.—J. E. Harsh✪; S of Mfrc.—A. T. Hutchins; S. of Distrib.—D. E. Byerley; N.—J. E. Shuff; Sec.—O. R. Mallat.✪

McCOOK—Citizens Gas Co.—W
M.—F. A. Pennell✠; E.—Fred Pfeffer; S. and N.—A. Smith.✪

NEBRASKA CITY—Nebraska City Utilities Co. (49)—C
M.—C. P. Gross✪; S.—Robt. Cunningham.✪

NORFOLK—Norfolk Gas Co.—W
M.—H. J. Cole; E.—Herman Dubbet.

NORTH PLATTE—North Platte Lt. & Pr. Co. (93)—W
G. M.—Willis Todd, Omaha✠; L. M.—C. R. Morey.

OMAHA—Omaha Gas Co. (160)—W
M.—Wm. H. Taylor; S. of Mfg.—G. M. Johnson; S. of Dist.—J. Lucena; N.—C. S. Phillips.

ORD—Ord City Gas Co.—W.
M.—Lafe Paist; E.—A. Thill.

PLATTSMOUTH—Nebraska Lighting Co. (140)—W
M.—F. E. Smith; E.—Elmer Elliot✪; S.—Del Hutson.

YORK—York Gas & Elec Co. (140)—W
G. M.—Jas. B. Harvey; N.—I. C. Messplay.

..... NEVADA. .....

CARSON CITY—Carson City Coal Gas Co. (94)—O
M.—George A. Campbell, Reno, Nev.; S.—W. H. Phillips; N.—H. A. Lemmon.

GOLDFIELD—Globe Gas Co.
M.—C. C. Manker; S. & Sec.—F. Fremont Reed.

RENO—Reno Power, Light & Water Co. (94)—W
M.—George A. Campbell✠; S.—W. N. Phillips; N.—H. A. Lemmon.

TONOPAH—Nevada Gas Co. (12)—O
M.—H. C. Dowler✠; Treas. & G. M.—L. P. Lowe, 626 Pacific Bldg., San Francisco.

..... NEW HAMPSHIRE. .....

CLAREMONT—Claremont Gas Light Co.—W
M.—F. R. Thomas.

CONCORD—Concord Light & Power Co. (160)—W
S.—A. J. Smith.

DOVER—Twin State Gas & Elec. Co. (46✠)—W (See Brattleboro, Vt.)
M.—A. D. Foster.✪

EXETER—Exeter Gas Light Co.—C
S.—A. F. Cooper.✠

FRANKLIN FALLS—Franklin Light & Power Co.—O
S.—Jno. P. Proctor.✠

KEENE—Keene Gas & Elec. Co.—W
M.—Ralph D. Smith; E.—J. H. Jackson; N.—C. D. Biverstock.

LACONIA—Laconia Gas & Elec. Co.—W
S.—F. T. Brockington.

MANCHESTER—Peoples Gas Light Co. (160)—C & W
M.—W. G. Africa; E.—A. H. Scott; N.—J. C. Aaron.

NASHUA—Nashua Lt., Heat & Power Co.—C & W
M.—Walter F. Norton✠; N.—J. A. Langelier.

PORTSMOUTH—Portsmouth Gas Co.—C
M.—E. Seybolt✠

ROCHESTER—Strafford-York Gas Co.—C & W
M.—E. C. Andrews.

SOMERSWORTH—Strafford-York Gas Co.—C & W
S.—E. C. Andrews.

NEW JERSEY.

ATLANTIC CITY—Atlantic City Gas Co. (148)—W
M.—Carlton Geist; S.—David Henry; N.—L. N. Yetter.

ATLANTIC HIGHLANDS—Standard Gas Co. (158)—W
M.—R. H. Garrison.

BAYONNE—Public Service Gas Co. (98)—W
M.—A. H. Glendinning.

BELMAR—Coast Gas Co.—W
Pres. & S.—Jos. Mayer; M.—A. H. Osborn✠; E.—Thos. Martin; N.—Lewis Thorne✪.

BOONTON—Boonton Gas Lt. & Imp. Co.—W
M.—W. E. Van Fatten; S.—Chas. Hill✪.

BOUND BROOK—Public Service Gas Co. (98)—W
N.—Geo. E. Reed.

BRIDGETON—Bridgeton Gas Light Co.—C
S.—Jacob B. Jones✠; E.—Wm. W. Messick✪; N.—Leo Du Bois, Jr.

BURLINGTON—Public Service Gas Co. (98)—W
G. L. Dold.

CAMDEN—Public Service Gas Co. (98)—W & C
Div. Agt.—S. T. Corliss; Asst. D. A.—C. G. Cook; Asst. N.—M. F. Perkins; Local Agt.—W. E. Shreve; E.—Geo. W. Curtis; E. of Distrib.—Harry Ellis.

CAPE MAY—Cape May Lt. & Pr. Co. (152)—W
M.—J. H. Orr.

CEDARVILLE—Lawrence Gas Co.—C and W
G. M.—S. J. Franklin; S.-N.—Ralph H. Lee.

DOVER—New Jersey G. & E. Co. (73)—W
G. M.—B. S. Woodman.

EGG HARBOR CITY—Enterprise Gas Co.—W
M.—Samuel Winterbottom; S. & E.—Fred Mueller.

ELIZABETH—Elizabethtown Gas Lt. Co.—W
S.—Francis Engel✠; N.—Charles C. Denton.

ELIZABETH—Public Service Gas Co. (98)—W
Div. Agt.—H. P. Chandler; Asst. N.—E. P. Shearer.

ELMER—New Jersey Gas Co.
S.—Adam Beckett.

ENGLEWOOD—Public Service Gas Co. (98)—W
Agt.—A. Clabaugh.

FLEMINGTON—New Jersey Northern Gas Co.—W
S.—W. W. Garrison; N.—J. J. Power (Lambertville, N. J.).

FREEHOLD—Standard Gas Co.
S.—H. Freeman.

GLASSBORO—New Jersey Gas Co. (146)—W
G. M.—Chas. W. Hoy; S. of Mnfre.—S. A. Goodman✪; S. of Dist.—L. A. Gosnel.

HACKENSACK—Public Service Gas Co. (98)—W
Dist. Agt.—E. C. Roberts; L. M.—W. H. Haight; E.—J. N. Killgore; N.—Peter Xylander.

HAMMONTON—Hammonton & Egg Harbor City Gas Co.—W
S.—H. C. Doughty✠; E.—H. M. Horton✪.

HOBOKEN—Public Service Gas Co. (98)—W
Agt.—E. G. Kent.

JERSEY CITY—Public Service Gas Co. (98)—W
D. M.—F. W. Schmidt; L. M.—W. Greacen; Sp'l Agt.—J. Kennedy; E.—E. J. Donahue; S.—James Ashworth; S. M.—G. E. Smith.

KEANSBURG—Standard Gas Co. (158)
S.—E. Finnegan.

KEYPORT—Standard Gas Co. (158)—C
S.—M. R. Hurley; N.—C. J. DeMers.

LAKEWOOD—Lakewood Gas Co.—W
G. M.—A. H. Osborn; E.—Lewis Thorne.

LAUREL SPRINGS—New Jersey Gas Co.
S.—Samuel Smith.

LAMBERTVILLE—Lambertville Pub. Service Co. (73)—W
M.—John J. Power; S.—R. P. Mareau.

LEESBURG—Maurice River Gas Co. (96)—W
N.—Ralph E. Lee.

LONG BRANCH—Consolidated Gas Co. of New Jersey (105)—W
M.—Fred R. Cutcheon; E.—L. E. Dequine; S.—Irving Black; N.—H. W. Danser.

MEDFORD—Medford Gas Co.—W
Pres.—E. B. Reeve✠; S.—Geo. W. Mingin.

METUCHEN—Metuchen Gas Lt Co.—W
S.—A. F. Reitemeyer; Agent—D. A. Power.

MILLVILLE—Millville Gas Light Co. (96)—C & W
M.—S. J. Franklin; S.—W. C. Buell; N.—B. Frank Buck.
Above officers also are officers for The Commercial Gas Co., of Port Norris, N. J.; Deerfield Gas Co., of Rosenhayn, N. J.; Downe Township Gas Co., of Newport, N. J.; Fairfield Gas Co., of Fairtown, N. J.; Lawrence Gas Co., of Cedarville, N. J.; Pittsgrove Gas Co., of Norma, N. J., and Citizens Gas Co., of Landis Township.

MONTCLAIR—Public Service Co. (98)—W
Agt.—F. S. Breese.

MORRISTOWN—Public Service Gas Co. (98)—W
L. M.—G. W. Davis.

NEWARK—Public Service Gas Co. (98)—W & C
Div. Agt.—H. H. Wells; Agt.—W. M. Halsey; E.—H. H. Ferris; E. of Distrib.—F. A. Lydecker; N.—J. P. Hanlan✪; Asst. N.—F. France.

NEW BRUNSWICK—Public Service Gas Co. (98)—C
L. M.—W. F. Thomas; S.—J. B. Robeson.

NEWTON—Newton Gas & Elec. Co.—C & W
M.—G. W. Johns✪; E.—Alviah Rice✪.

OCEAN CITY—City Gas Light Co.—W
M.—H. C. Schanze Jr.; E.—Jos. Meyer; N.—Alfred S. Haight.

ORANGE—Public Service Gas Co. (98)—W
L. M.—J. P. Zingg.

PASSAIC—Public Service Gas Co. (98)—W
L. M.—Herman Benz; A. S.—O. H. Folger.

(New Jersey—Continued)

PATERSON—Public Service Gas Co. (98)—W
D. M.—W. H. Rogers; L. M.—R. I. Wilson; E.—Chas. J. Roeser; Asst. N.—N. H. Potter.

PAULSBORO—Municipal Gas Plant—W
S.—Jas. A. Wert; N.—Wm. Morris✠; A. L. Brown and George K. Lodge.

PENN'S GROVE—New Jersey Gas. Co.
S.—Geo. M. Pyne.

PERTH AMBOY—Perth Amboy Gas Lt Co.—C
M.—A. F. Reitemeyer.

PITMAN—New Jersey Gas Co.
S.—Jos. Kirkpatrick.

PLAINFIELD—Public Service Gas Co. (98)—W
Agt.—W. R. Causebrook; E.—Thos. Mellck.

PLEASANTVILLE—Pleasantville Heat, Lt. & Power Co.—W
G. M.—Jno. P. Tompkins; S.—Harry Lovett.

PORT NORRIS—Commercial Gas Co.—W
M.—Ralph H. Lee.

PRINCETON—Public Service Gas Co. (98)—W
L. M.—W. R. Brearley; S.—John T. Hoff.

RAHWAY—Rahway Gas Lt. Co.
M.—Francis Engel; N.—Charles Howard.

RIDGEWOOD—Public Service Gas Co.
L. M.—J. L. Farrell.

RUTHERFORD—Public Service Gas Co. (98)—W
L. M.—Andrew Pruden.

SALEM—Salem Gas Light Co.—C
G. M.—John F. Pendergast✠; S.—Fred Fowler.

SEA ISLE CITY—Seashore Gas Co.—W
Pres.—Henry Rohner; Treas.—Geo. Anderson; S.—P. J. Wall.

SOMERVILLE—Public Service Gas Co. (98)—W
L. M.—P. C. Carolan; S.—A. L. Way.

SOUTH AMBOY—Public Service Gas Co. (98)—W
L. M.—J. L. Housel; S.—Chas. Dufford.

SUMMIT—Public Service Gas Co. (98)—W
L. M.—M. S. Sherwood.

SWEDESBORO—New Jersey Gas Co.—W
M.—C. W. Hoy✪; S.—A. F. Betz.

TOMS RIVER—Ocean County Gas Co. (158)
M.—N. A. McClary✠; N.—A. W. Brown.

TRENTON—Public Service Gas Co. (98)—W
L. M.—H. H. Newman; S.—J. H. Galt.

TUCKERTON—Tuckerton Gas Co. (158)
M.—N. A. McClary✪; N.—H. H. Stille✪
1633 Real Estate Trust Bldg., Phila.

VINELAND—Citizens Gas Co. (96)—W
S.—R. W. Lee; N.—L. H. Burge✪.

VINELAND—New Jersey Gas Co.
S.—John Calkins.

WASHINGTON—Washington Gas Co.—W
G. M.—D. V. Wyckoff✠; M.—H. W. Ridgway; E.—Wm. S. Cowell.

WESTFIELD—Cranford Gas Light Co.—W
M.—Harry B. Udell✠.

WEST HOBOKEN—Public Service Gas Co. (98)—W
L. M.—W. G. Graecen.

WEST NEW YORK—Pub. Serv. Gas Co.
Agt.—E. V. Walsh.

WILDWOOD—Wildwood, Anglesea & Holly Beach Gas Co. (146)—W
S.—Charles Croker; E.—C. H. S. Sinclair.

NEW MEXICO.

ALBUQUERQUE—Albuquerque Gas, Elec. Lt. & Power Co. (112)—C
M.—W. P. Southard; E.—Frank Strickland; N.—Chas. A. Hall.

ROSWELL—Roswell Gas & Elec. Co.—O
S.—C. M. Einhart✠; E.—A. L. Park; N.—Geo. Honeywell.

NEW YORK.

ALBANY—Municipal Gas Co.—W
Pres.—N. F. Brady; Sec.-Treas.—Wm. G Furlong; V. P. & G. M.—Carl H. Graf; S.—Frank S. Dunn.

ALBION—Western N. Y. Utilities Co.—C
Pres.—A. L. Swett✠; S.—C. S. Swett.

AMSTERDAM—Chuctanunda Gas Light Co.—C & W
M.—Geo. D. Conlee.✠

AUBURN—Empire Gas & Elec. Co. (100✠)—C
M.—H. L. Coleman; E.—H. O. Palmer; S.—C. Whittington; N.—W. P. Moran; Ind. E.—H. G. Storise.

BABYLON—South Shore Gas Co.
M.—C. H. Burns; N.—Chas. E. Spellman; S.—Robt. Burns.

BATH—Bath Elec. & Gas Lt. Co.—W
M.—Frank Nollett.✠

BAY SHORE—Suffolk Gas & Elec. Lt. Co.—W
M.—A. H. Vail.

BEACON—Southern Dutchess G. & E. Co.
M.—J. T. Smith; S.—C. H. Loiselle.

BINGHAMTON—Binghamton Gas Works (105)—W
M.—E. H. Kifer; S.—A. W. Outzen; N.—E. S. Crossett.

BROCKPORT—Brockport Gas Lt. Co.—C
M.—Sidney R. Walker.✠

BROOKLYN—Brooklyn Borough Gas Co.—W
M.—G. H. Woodall✠; S.—H. J. Dillon; N.—M. E. Dillon.

BROOKLYN—Brooklyn Union Gas Co.—W
Controls: Flatbush Gas Co., Brooklyn; Newtown Gas Co., Elmhurst, N. Y.; Jamaica (N. Y.) Gas Lt. Co.; Woodhaven Gas Lt. Co., Jamaica, N. Y.; Richmond Hill & Queens County Gas Lt. Co., Richmond Hill, N. Y. Pres. & E.—J. H. Jourdan; Asst. E.—A. F. Stanniford; S. of D.—J. H. Braine; E. of Con.—L. S. Stiles; N.—T. M. Ambler; I. E.—C. E. Chapple; G. W. Gatehouse.✠

BROOKLYN—Flatbush Gas Co. (99)—W
G. M.—H. E. McGowan; S.—E. J. Devlin; G. W. Gatehouse.✠

BROOKLYN—Kings County Lighting Co.—W
4802 New Utrecht Ave.
V. P. & C. E.—T. E. Byrne; G. M.—Ralph Eisman; E.—H. P. Fells; S.—E. W. Stephens; N.—R. E. Dallas.

BUFFALO—Buffalo Gas Co.—W
M.—W. S. Riselay; E.—Harry C. Palmer; N.—J. C. Simon.

(New York—Continued)

CANASTOTA—Central N. Y. Power Co.—C & W
S.—Edward Lewis.✠

CATSKILL—Upper Hudson Elec. & Ry. Co.—C
M.—W. K. Higgenbothom.

COHOES—Cohoes Gas Light Co.—W
M.—W. P. Parsons; S.—Geo. E. Marrin.

CORNING—Corning Light & Power Corp.—W
M.—J. H. Doherty.✠

CORTLAND—Homer & Cortland Gas Lt. Co. (132)—C
M.—J. W. Murdock; E.—C. S. Greenridge; S.—J. J. Boyle; N.—B. F. Miller.

DANSVILLE—Dansville Gas & Elec. Co.—W
M.—C. H. Mason; Sec.-S.—C. G. MacEvoy.

EAST SYRACUSE—Syracuse Suburban Gas. Co.✪
M.—O. R. Evans✪; E.—Nathan Gellert.✪

ELMHURST—Newtown Gas Co.—W
M.—E. M. Smith.

FAR ROCKAWAY—Queens Borough Gas & Elec. Co.—W
M.—Carleton Macy; G. S.—L. A. Howland; Gas S.—E. L. Davies; N.—A. M. Wiley.

FISHKILL-ON-HUDSON—Southern Dutchess Gas & Elec. Co.—W
S.—C. H. Loiselle; Treas.—Jno. T. Smith.✠

FLUSHING—New York & Queens Gas Co.—W
M.—M. H. Spear✠; E.—G. E. Woods✪; S.—M. Morrison✪; N.—J. L. Thomas.

FREEPORT—Nassau & Suffolk Lighting Co. (120✠)—W
(See Hempstead, N. Y.)

FULTON—Fulton Fuel & Light Co. (78)—C & W
M.—J. G. Light; E.—H. M. Eaton, Union Traction Bldg., Detroit, Mich.; N.—L. E. Pollack.

GENESEO—Geneseo Gas Lt. Co.—C
S.—T. W. Landon.✠

GENEVA—Empire Gas & Elec. Co. (100)—C
G. M.—H. L. Coleman; S.—J. E. McSweeney; N.—M. H. Halpin✪.

GLEN COVE—Sea Cliff & Glen Cove Gas Co.—W
M.—C. H. Burns✠; S.—J. Brooks.

GLENS FALL—Glens Falls Gas & Elec. Light Co. (136)—C
G. M.—H. M. Collin; S.—H. Rochat.

GLOVERSVILLE—Fulton County Gas & Elec. Co. (160)—W
M.—L. S. Smith✠; E.—R. N. Zeek; N.—H. D. O'Brien.

GOSHEN—Goshen Illuminating Co.—C
M.—Jno. H. Findlay.✠

GRANVILLE—Granville Elec. & Gas Co.—W
M.—Paul Fesoli.

HAVERSTRAW—West Shore Gas Co.—W
S.—J. A. Smith✠; E.—J. Weir.

HEMPSTEAD, L. I.—Nassau & Suffolk Lighting Co. (120✠)—W
M.—G. MacDonald; G. S.—E. T. MacBride; E.—Chas. B. Morgan; S. of D.—C. F. Callahan✪; N.—R. R. Rowe.

HERKIMER—Utica Gas & Elec. Co.
S.—Frank M. Baker.

HUDSON FALLS—United Gas, Elec. Lt. & Fuel Co.—C
M.—H. M. Collins✠; E.—L. R. Nicols; S.—A. C. Fox.

HUDSON—Albany Southern Railroad Co.
(See Renssalaer.)
G. M.—Jas. E. Hewes; S.—J. E. Newman.

HUNTINGTON—Huntington Gas Co.—W
(New York Lighting Co., 50 Church St., N. Y.)

ILION—Utica Gas & Elec Co.
S.—J. P. McGreevy.

ISLIP, L. I.—Suffolk Gas & Elec. Lt. Co.—W
M.—A. H. Vail.

ITHACA—Ithaca Gas & Elec. Co. (132)—C
M.—W. J. Murdock; S.—W. E. O'Neill; N.—J. B. Carey.

JAMAICA—Jamaica Gas Light Co. (99)
M.—H. A. Lovell; G. W. Gatehouse.✠

KINGSTON—Kingston Gas & Elec. Co. (142)—C & W
M.—F. Tobey, Jr.; A. M.—C. R. Stull; N.—W. C. Rivenburg.

LITTLE FALLS—Utica Gas & Elec. Co.
S.—L. E. Thompson.

LOCKPORT—Lockport Lt., Heat & Power Co. (130)—C & W
M.—J. A. Perkins; S.—E. L. Benton✪; N.—M. J. Healey✪.

LONG BEACH—Long Beach Gas Co.
Pres.—D. B. Helm; N.—C. Wallelmus.

LONG ISLAND CITY—East River Gas Co. of Long Island City—C & W
S.—Clifford S. Fox.

LONG ISLAND CITY—New Amsterdam Gas Co. (107)
M.—G. W. Doane; E.—C. Atwood; S.—E. B. Hyde; N.—G. W. Doane.

LYONS—Gas & Elec. Co. (100)—C
S.—K. C. Farnsworth. See also Geneva, N. Y.

MALONE—Malone Lt. & Power Co.—C
S.—S. G. Hunter✠; E.—B. W. Aubrey✪; N.—C. F. Mason.

MASSENA—Aluminum Co. of America.
M.—Chas. A. Gruber.

MECHANICSVILLE—Halfmoon Lt., Heat & Power Co.—W
M.—H. L. Lake.✠

MEDINA—Medina Gas Co.—C
M.—John Collins; N.—W. J. Collins.

MIDDLETOWN—Orange County Lighting Co.—W
M.—C. H. Stone.

MILLBROOK—Millbrook Gas & Electric Co.—A
S.—Jas. H. Murphy.✠

MOUNT VERNON—Westchester Lighting Co. (107)—W
E.—G. Trenholm Macbeth; N.—W. L. Secord.

NEWARK—Empire Gas & Elec. Co.✪
S.—W. J. Callahan.✪

NEWBURGH—Central Hudson Gas & Elec. Co.—W (See Poughkeepsie.)—W
N.—A. R. Beal; S.—W. J. Hannan✪; I.—C. K. Waldron✪

(Over)

(New York—Continued)

NEW YORK—Central Union Gas Co. (107)—C & W
S. of D.—A. H. Hall; S. of M.—Elliott L. Spencer; Jno. W. Deuel.✠✪

NEW YORK—Consolidated Gas Co.
Chm. of Bd.—H. E. Gawtry; Pres.—Geo. B. Cortelyou; V. P.—W. R. Addicks and L. B. Gawtry; V. P.-Sec.—R. A. Carter; Treas.—C. G. M. Thomas✪; Chf. E.—Wm. H. Bradley; Commercial Dept. (130 East 15th St.)—F. R. Barnitz, Gen. Supt.; H. B. Reinach, Asst. Gen. Supt.; H. B. McLean, New Business-Promotion Div.; G. M. Karshner, Hotel and Restaurant Div., Domestic Div.; J. F. Reynolds✪, Industrial Div.; Pur. Agt.—Edwin North.✪

NEW YORK—New Amsterdam Gas Co. (107)—W
Pres.—Geo. W. Doane; Sec.-Treas.—M. M. Graham; A. M. Wert.✠

NEW YORK—Municipal Lighting Co.
Pres.—W. G. Hoyt; A. S.—John Doyle; N.—C. S. Gravatt.

NEW YORK—New York Mutual Gas Lt. Co. (107)—W
S.—Isaac McGraw; Asst. Sec.—Edwin S. Young.✠

NEW YORK—Northern Union Gas Co. (107)—C & W (1815 Webster Ave.)
E.—A. H. Hall; A. C. Lord✠; S.—W. J. MacDaniels.

NEW YORK—Standard Gas Light Co. (107)—W
Pres.—W. A. Hoyt; Sec.—Jno. E. Sanborn; E.—Geo. E. Woods✪; S.—Jas. T. Kennedy.

NIAGARA FALLS—Niagara Falls Gas & Elec. Lt. Co.—C
M.—A. H. Merritt.✠

NORWICH—Norwich Gas & Elec. Co. (132)—W
S.—P. R. Chambers.

NYACK—Rockland Light & Power Co.—W
M.—E. C. Peebles; N.—T. F. Odell.

OGDENSBURG—Ogdensburg Gas Co.—C
M.—Wm. B. Voth.

ONEIDA—Adirondack Elec. Pr. Corp'n.—C
M.—Wm. A. Buttrick; S.—A. E. Shippee; N.—Geo. Guyette.

ONEONTA—Oneonta Lt. & Pwr. Co. (100)—W
S.—E. L. Sellers.✪

OSSINING—Northern Westchester Lighting Co. (107)—W
Asst. G. M.—I. M. Beatty✠; S.—A. W. Terry, Jr.

OSWEGO—Peoples Gas & Elec. Co. (76)—C
M.—R. F. Whitney; E.—James Hurley✪; S.—R. F. Burnett.

OWEGO—Empire G. & E. Co. (100)—C
S.—F. W. Wenban.

PALMYRA—Empire G. & E. Co. (100)
S.—F. Whipple.

PATCHOGUE—Patchogue Gas Co.—W
E.—C. H. Burns S.—Asa Brooks.

PEEKSKILL—Peekskill Lighting & R. R. Co. (107)—W
G. M.—Stuart Wilder; A. M.—I. M. Beatty.

PENN YAN—Penn Yan Gas Lt. Co.—C
M.—Morris Tracy; S.—M. F. Buckley.

PHELPS—Empire G. & E. Co. (100)
E.—R. C. Smith✪; S.—B. O. Beard.✠

PLATTSBURGH—Plattsburgh Gas & Elec. Co.—W
M.—Geo. M. Coles; E.—John Morey; S.—H. A. Stutchbury.

PHOENIX—Phoenix Gas & Electric Co.

PORT JERVIS—Port Jervis Light & Power Co.—W
M.—W. R. Ottey✪; S.—Samuel T. Beatty.

PORT WASHINGTON, L. I.—Public Service Corp. of Long Island.
M.—Henry MacDonald✠; S.—T. V. Dempsey✪; N.—W. A. Doyle.

POUGHKEEPSIE—Central Hudson Gas & Elec. Co.—W
Asso. M.—H. M. Beugler, C. H. Scherck✪; C. F. A. Burnes✪; E.—Jno. O. Fuchs✪; S.—G. A. Voorhees✪; N.—J. J. Cagney✪; I.—C. A. Lasher✪; F. M. Stark.✠

RENSSALAER—Albany Southern R. R. Co.—W
G. M.—Jas. E. Hewes✠; S.—J. E. Newman.

RICHMOND HILL—Richmond Hill & Queens County Gas Light Co. (99)
M.—H. A. Lovell (see Jamaica); G. W. Gatehouse.

ROCHESTER—Despatch Ht., Lt. & Pr. Co.
M.—J. O. Montignani; S.—F. Hellen.

ROCHESTER—Rochester Ry. & Lt. Co.—C & W
V. P.—Robert M. Searle; G. M.—J. T. Hutchings; E.—J. P. Haftenkamp; S. of M.—Herman Russell; S. of D.—V. A. Miller; I.—J. P. McSweeney; I. E.—I. Lundgaard; J. B. Eaton.✠

ROME—Rome Gas, Elec. Lt. & Power Co. (152)—C & W
M. & N.—A. B. Morton.

ROOSEVELT, L. I.—Nassau & Suffolk Lighting Co. (120✠) (See Hempstead.)

SAG HARBOR—Long Island Gas Corpn.—W
M.—R. C. Gravely.

SARANAC LAKE—Saranac Lake Gas Co.—W
M.—M. W. Bogue.✪

SARATOGA SPRINGS—Adirondack Elec. Pr. Corp'n.—W
M.—Wm. A. Buttrick; S.—Patrick F. Roohan; E.—H. J. Hunsicker.

SAUGERTIES—Saugerties Gas Light Co.—C
M—Thos. F. Walsh.✠

SCHENECTADY—Mohawk Gas Co.—C & W
M.—Henry W. Peck; S.—M. G. Welsh; N.—L. E. Cass.✠

SENECA FALLS—Empire G. & E. Co. (100)—C
S.—G. Meyer.

STAPLETON, L. I.—New York & Richmond Gas Co.—W
M.—W. J. Welsh; E.—Geo. F. Goodnow; S.—Wm. McCleary; N.—F. E. Newberry.

SUFFERN—Suffern Gas Co.—W.
S.—A. H. Kelsall.✠

SYRACUSE—Syracuse Lighting Co. (160)—C & W

(New York—Continued)

M.—Jas. C. DeLong; E.—S. J. Dickey; N.—A. D. Dudley.

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TONAWANDA—Niagara Light, Ht. & Pr. Co.—C & W
G. M.—C. W. Wallace; S.—Geo. Neall✪; N.—E. H. Beam.

TROY—Troy Gas Co.—W
M.—H. C. Shields.

UTICA—Utica Gas & Elec. Co. (136)—W
M.—Wm. J. Cahill; S.—H. G. Johnson; S. L. P.—Leonard Drake; S. H. P.—Herman Johnson; N.—M. J. Goldbos.

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WATERLOO—Empire G. & E. Co. (100)—C
S.—J. E. McSweeney; N.—Martin Halpin.

WATERTOWN—Northern New York Utilities Co.—C & W
G. M.—F. A. Rogers; M. Gas Dept.—Peter Young✠; N.—G. A. Dunn.

WATERVILLE—Waterville G. & E. Co.
M.—R. H. Terry✪; S.—Robt. Thomas.✪

WATKINS—Watkins Illuminating & Power Co. (134)—C
Pres.—G. A. Walter; S.—Clarence Seeley.✠

WAVERLY—Gas Light Co. of Waverly.—W
M.—O. L. Haverly.✠

WESTCHESTER—Bronx Gas & Elec. Co.—(107)—W
M.—E. H. Rosenquest✠; S.—J. M. Butler; N.—Wm. A. Root.

WEST POINT—Government Gas Plant.
S.—Ira N. Goff; Lt. Col. E. J. Timberlake✠

—Natural Gas Companies—

ADDISON—Addison Gas & Power Co.
M.—M. T. Cassada.✠

AKRON—Akron Natural Gas Co. (108)
M.—T. B. Crary; Pres.—D. D. Eckerson, Buffalo.✠

ATTICA—Attica Natural Gas Co. (108)
M.—T. B. Crary.✪

BALDWINSVILLE—Baldwinsville Lt. & Heat Co.
M.—J. T. Wilkins.✠

BATAVIA—Alden-Batavia Natural Gas Co.
S.—E. B. Kellogg.

BUFFALO—Dominion Natural Gas Co. (108)
G. M.—F. M. Lowry; S.—H. R. Davis.

BUFFALO—Iroquois Natural Gas Co. (122)
Pres.—B. C. Oliphant✠; E.—G. E. Welker; S.—John H. Walsh.

BUFFALO—South Shore Natural Gas & Fuel Co. (108)
G. M.—F. M. Lowrey; S.—H. R. Davis.✪

CALEDONIA—Tri-County Natural Gas Co.
M.—A. Miner Wellman; S.—A. G. Baker.

CANISTEO—Canisteo Gas Co.—C
M.—J. B. Bradley.

CHURCHVILLE—Churchville Oil & Gas Co.✪
M.—A. H. Carson.✪

CORNING—Crystal City Gas Co.
M.—G. S. Goff; E.—W. M. Gurnsey.✠

DUNKIRK—South Shore Gas Co. (103)
L. M.—G. E. Falk; S.—F. Fair.

ELMIRA—Elmira Water, Lt. & R. R. Co.—(130)
M.—F. H. Hill; E.—H. E. Gough; S.—D. H. Harrington; N.—R. W. Hoy.

FREDONIA—Frost Gas Co. (108)
M.—C. J. Berg.✪

GOWANDA—Gowanda Natural Gas Co.
M.—M. McIntyre; F. J. Straub.✠

HONEOYE FALLS—Ontario Gas Co.
S.—C. E. Hill, Batavia, N. Y.

HORNELL—Hornell Gas Lt. Co.
S.—J. B. Bradley.✠ (See also Wellsville.)

LANCASTER—Depew & Lancaster Lt. Pr. & Conduit Co.
M.—Ernest Feyler; A. R. Tremaine.✠

LE ROY—Pavilion Natural Gas Co.
M.—J. S. L. Purdy; S.—E. J. White; N.—G. W. Daggs; J. H. Friday.✪✠

NEWARK—Empire G. & E. Co. (100)
S.—W. J. Callanan.

OLEAN—Keystone Gas Co.
M.—J. A. Johnson; E.—C. A. Turner; N.—H. E. Manley✪; J. N. Pew, Jr.✠

OLEAN—Producers Gas Co.
M.—F. W. Herron.

PULASKI—Pulaski Gas & Oil Co.
M.—Geo. W. Douglass.✠

SANDY CREEK—Sandy Creek Oil & Gas Co., Ltd.
M.—D. A. Colony✠; S.—B. A. Crandall.

SILVER CREEK—Silver Creek Gas & Impv't Co.
M.—W. A. Campbell.

WATKINS—Consumers Natural Gas Co.
M.—Geo. G. Reynolds, Elmira, N. Y.✠; S.—Wm. Gibbins.

WELLSVILLE—Empire Gas & Fuel Co., Ltd.
Pres.—Harry Bradley; V. P.—Geo. H. Bradley, Bolivar, N. Y.; S.—E. S. Harder.

WEST SENECA—Peoples Natural Gas Co.✪
M.—B. F. Dowd.✪

WILLIAMSVILLE—Williamsville Natural Gas Co.
M.—J. W. Stearns.✠

..... **NORTH CAROLINA.** .....

ASHEVILLE—Asheville Power & Lt. Co. (110)—C
M.—H. W. Plummer; S.—J. D. Caldwell.

BURLINGTON—Burlington Gas Co.✪
Pres.—J. B. Lydecker✪; E.—B. Van Steenburg✪, Room 1022, No. 26 Cortlandt St., N. Y. City.

CHARLOTTE—Southern Public Utilities Co.—C
G. M.—D. G. Calder; S.—Henry Collins.

CONCORD—Concord Gas Co. (153)—W
M.—J. S. Palmer✪; E.—N. H. Gellert.✪

DURHAM—Carolina Power & Light Co. (110)—C (See Raleigh.)
L. M. & S.—N. L. Clay.

ELIZABETH CITY—Southern Gas Improvement Co. (154)—W
M.—Jas. T. Stallings; S.—T. V. Sanderson; N.—W. K. Stallings.

FAYETTEVILLE—Fayetteville Lt. & Pr. Co.—C
M.—I.—A. R. Moffit; E.—W. W. Randolph,

(North Carolina—Continued)

N. Y. City; S.—J. A. McGilvary; N.—J. A. Goodman.

GASTONIA—Gaston County Gas Co. (153)
E.—L. C. Smith; S.—H. K. Logan.

GOLDSBORO—Goldsboro Gas Co. (153)—W
M.—B. D. Harriman✪✠; E.—H. D. Wood.✪

GREENSBORO—North Carolina Public Service Co. (137)—C & W
G. M.—R. J. Hole; S.—C. M. Crawford; N.—B. F. Pickard.

HENDERSON—Southern Gas Improvement Co. (154)—W
M.—J. S. M. Wharton; S.—T. W. Upton.

HIGH POINT—North Carolina Pub. Service Co. (137)—W
S.—J. H. Jennings.

NEW BERN—New Bern Gas Co. (153)—W
M.—H. D. Wood.

RALEIGH—Carolina Power & Light Co. (110)—W
G. M.—H. H. Carr; S.—Noble L. Clay✪; N.—Samuel Smith.✪

ROCKY MOUNT—Rocky Mount Gas Wks.—W
M.—L. M. Jordan.✪

SALISBURY—North Carolina Public Service Co. (137)—C
M.—R. J. Hole✠; E.—C. M. Crawford; S.—R. G. Hobbs✪; N.—J. H. Robertson.

STATESVILLE—Statesville Gas Co.
Pres. & E.—F. D. Moses, Trenton, N. J.; S. & N.—M. L. Love.

WASHINGTON—Washington Gas & Water Co.—W
M.—Geo. F. Leach✪; S.—J. T. Bland.

WILMINGTON—Tidewater Power Co.—C & W
M.—A. B. Skelding; E.—W. W. Randolph (N. Y.); S.—E. C. Hudson; N.—H. M. Bremer.

WILSON—Gas City Dept.
M.—R. J. Grantham; E.—Fred C. Armbruster.

WINSTON-SALEM—Winston-Salem Gas Co. (78)—C
M.—Jos. B. Smith; S. of Mfg.—J. A. Hill; S. of Dis.—Jas. H. Vernon; N.—Thos. C. McKenzie, Jr.

..... **NORTH DAKOTA.** .....

BISMARCK—Bismarck Gas Co.
S.—Geo. B. Hawley; N.—Frank W. Olds.✪

ELLENDALE—Ellendale Light & Power Co.—W
Pres.-M.—H. D. Mitchell.

FARGO—Union Lt., Heat & Power Co. (34)—C
M.—M. L. Hibbard✠; S.—E. E. Harnish; N.—A. G. Bucholz.✪

GRAND FORKS—Red River Power Co.—C
M.—W. H. Brown.✠

JAMESTOWN—Jamestown Gas Co.—W
M.—H. P. Taylor; S.—T. J. Ahearn.

MINOT—Minot Gas Co.
M.—Robt. E. Barron; S.—S. J. La Due; N.—Halvor L. Halvorson.

VALLEY CITY—Valley City Gas Co.—W
M.—F. E. Ployhar✠; S.—A. Bruce Cox.

..... **OHIO.** .....

ARCHBOLD—Archbold & Stryker Gas Co.
M.—J. V. Mullen.

BELLEFONTAINE—Bellefontaine Gas Co.—W
M. & N.—Clair A. Inskup✠; S.—M. D. Ehrhart.

BRYAN—Ohio Gas Light Co.

BUCYRUS—Bucyrus Lt. & Power Co.—W
M. and N.—A. G. Moser; S.—L. A. Springer; A. L. Wilkinson.✠

CENTERVILLE—Centerville Gas Plant.
Prop.—G. W. Lawson.

CHILLICHOTHE—Chillicothe Gas Lt. & Wtr. Co.—C
M.—F. A. Stacey✠; S.—Robt. Herron.

DEFIANCE—Defiance Gas & Elec. Co.—C
G. M.—W. P. Wallace; S.-A. M.—J. F. Deatrick, Jr.✠; E.—T. R. Wickenden (531 Spitzer Bldg., Toledo); S.—George Mead.

DELPHOS—Delphos Gas Co.—C
G. M.—F. A. Lane, Adrian, Mich.✠; S.—W. M. Moran.

GREENVILLE—Greenville Gas Lt. Co. (133)

HAMILTON—Hamilton Utilities Co.—C
Pres.—E. M. Peters.✠

HILLSBORO—Hillsboro Lt. & Fuel Co. (73)—C
M.—J. C. Martin.✪

LEBANON—Lebanon Gas Co.—O
S.—Wm. Carson.

MASSILLON—Massillon Elec. & Gas. Co. (108)
M.—W. O. Custer; N.—L. J. Lemen.✪

MECHANICSBURG—Mechanicsburg Gas & Light Co.—O
M.—V. G. Riddle.✠

NAPOLEON—Ohio Gas Lt. & Coke Co. (139)—C
Treas. & G. M.—J. A. Sloan✠; M.—Jas. V. Mullen.

PAINESVILLE—Painesville Gas & Coal Co.—C
M.—Geo. R. Moody; Pres.—Geo. P. Steele.✠

PAULDING—Paulding Gas & Fuel Co.—W
S.—V. B. McConahay; T. S. Atkinson, Van Wert, O.✠

RIPLEY—Ripley Gas Light & Coke Co.—C
G. M.—J. C. Leggett✠; E.—Ed. Chapman.

TOLEDO—Toledo Ry. & Lt. Co. (108)—C.
M.—F. J.Derge; E.—A. Johnson; S.—W. G. Cramer; N.—A. K. Young; I. E.—A. Gindele and H. J. Kunz; F. C. Torrey.✪✠

TROY—Troy Gas Co.
M.—E. W. Hanley.

VAN WERT—Van Wert Gas Lt. Co. (132)—W
S.—T. S. Atkinson.

WARREN—Trumbull Public Service Co. (108)—C
G. M.—E. L. Franklin; S.—M. L. Derge; N.—Wm. J. Marshall.

WILMINGTON—Wilmington Gas Lt. & Coke Co.—C
G. M.—G. N. Clapp✠; S.—F. D. Slifer.

YOUNGSTOWN—Youngstown & Sharon St. Ry. Co.
S.—Fred Coombs; C. O. Bailey.✠

(Ohio—Continued)

—Natural Gas Companies—

ADA—Ada Natural Gas & Fuel Co.
M.—Thos. M. Kier.✠

AKRON—East Ohio Gas Co.
N.—L. B. Terry.

ALLIANCE—Alliance Gas & Power Co. (108)
M.—F. C. Pratt; S.—H. M. Shickel; N.—H. F. Heyman.

AMHERST—Logan Natural Gas & Fuel Co.
L. M.—Geo. Christian.

ASHLAND—Logan Natural Gas & Fuel Co.
L. M.—W. H. Adams.

ASHTABULA—Ashtabula Gas Co.
M.—Frederick W. Stone.✠

BARBERTON—E. Ohio Gas Co. (Cleveland)
L. M.—S. C. McKnight.

BELLEVUE—Bellevue Gas Co. (170)
M.—Carl D. Mead; S.—W. J. Broder; N.—K. C. Krick (Columbus).

BEREA—Berea Pipe Line Co.
M.—M. K. Clover.✪

BUCYRUS—Logan Natural Gas & Fuel Co
M.—B. F. Spicer.

CADIZ—Cadiz Gas Co. and Harrison Lt. & Fuel Co.
Sec. & G. M.—Carl D. Mead.

CAMBRIDGE—Ohio Fuel Supply Co. (167)
Agent—A. C. Sarchet.

CANTON—East Ohio Gas Co. (Headquarters at Cleveland).
L. M.—W. J. Morgan; S.—D. C. Walsh.

CARROLLTON—American Gas Co.
M.—W. V. Baird.✠

CHILLICOTHE—Logan Natural Gas & Fuel Co.
S.—Chas. W. Morgan.

CINCINNATI—Union Gas & Elec. Co. (181)
Pres.—W. W. Freeman; V. P.—W. Y. Cartwright; S. of Gas—J. H. Lakamp; N.—H. J. Hoover; I.—W. L. Southwell.✪

CIRCLEVILLE—Buckeye Gas Co. (170)

CLEVELAND—East Ohio Gas Co.
Pres.-M.—Martin B. Daly; A. M.—R. W. Gallagher✪; E.—J. F. Gray; S.—J. G. Hanks; S. of C.—T. M. Lee; S. of D.—J. J. McMahon; N.—E. W. Wagner; Geo. Horsley.

COLUMBUS—Central Contract & Finance Co.
M.—N. P. Baker; E.—J. F. Spears.
Supplies Mt. Sterling, So. Charleston, New Carlisle, Northampton, Williamsport, Fremont, Washington C. H., Bloomingburg, etc.

COLUMBUS—Columbus Gas & Fuel Co. and Federal Gas & Fuel Co. (141)
Pres.—B. G. Dawes; M.—T. J. Jones; S.—J. P. Strickler✠; N.—Geo. S. Shinnick.

COLUMBUS—Logan Natural Gas & Fuel Co.
V. P. & G. M.—W. J. Broder✪; M.—P. W. Lupher; E.—W. J. Wonderly; S. of Distn.—Jas. F. Olmstead✪; S. of L.—C. J. Palm; N.—W. H. Adams; I.—R. B. Burr.

COLUMBUS—Miami Valley Gas & Fuel Co.
Supplies, Piqua, O.
M.—N. P. Baker.

COLUMBUS—Ohio Fuel Supply (167)
Pres.—Geo. W. Crawford; Asst. to Pres.—H. C. Reeser; V. P.—Fred W. Crawford; M.—J. M. Garard; E.—F. H. Crawford; S.—J. D. Sykes; S. of Con.—P. M. Biddison✪; S. of D.—J. F. Curry; Div. S.—Frank B. Reeser; N.—W. Re. Brown.

CONNEAUT—Northeastern Oil & Gas Co.
G. S.—N. E. Donnelly, Geneva, O.

COSHOCTON—Coshocton Gas Co. (108)
M.—E. B. Smith✠; S.—T. M. Kier.

DAYTON—Dayton Gas Co. (141)
V. P.—C. A. Ward; G. M.—Geo. Light†; S.—Ed. Light; N.—I. L. Lehman.

DELAWARE—Delaware Gas Co.
M.—T. C. Jones✠; S.—D. M. Rhodes✪; N.—J. F. Shoub; I.—Willard Evans.✪

EAST LIVERPOOL—Mfrs.' Lt. & Ht. Co.
M.—Thos. H. Stephens.

ELYRIA—Citizens Gas & Elec. Co. (170)
M.—Wm. M. Adams; S.—J. Renick.

FINDLAY—Citizens Lt. & Coke Co. (170)

FREEMONT—Freemont Gas, Elec. Lt. & Pr. Co.
Agt.—A. H. Lewis.

GENEVA—Northeastern Oil & Gas Co.
G. S.—W. E. Donnelly

GRANVILLE—Granville Fuel & Lt. Co.✪
M.—H. K. Dreibelbiss✪; H. G. Miller.✠

GREENVILLE—Jantha Light & Fuel Co.
S.—Edward Kagey.

HAMILTON—Municipal Gas Plant.
S.—H. R. Garver.

IRONTON—United Fuel & Gas Co.
M.—Ira Burford.

KANSAS—Northern Ohio Fuel Co.✪
M.—Alex. Bolton✪; J. S. Shaull.✠

KENTON—Hardin-Wyandotte Ltg. Co.✪
M.—P. M. Magley.✪

LANCASTER—City Natural Gas Works.
M.—Wenzel Helwig.

LANCASTER—Logan Natural Gas & Fuel Co. (170)
Supplies Ashland, Bucyrus, Cardington, Carey, Centerburg, Chicago, Chillicothe, Clyde, Crestline, Dayton, Delaware, Fostoria, Galion, Homer, Kingston, Logan, Mansfield, Mount Gilead, Monroeville, North Amherst, Norwalk, Plymouth, Rockbridge, Sandusky, Shelby, Thornville, Tiffin, Upper Sandusky, Utica, Westerville, Lancaster, Adelphi, Clearport, Galena, Hallsville, Hebron, Laurelville, Millerport, Sugar Grove, Stoutsville, Findlay and Sunberry, in Ohio.
G. M.—P. W. Lupher; P. A.—A. A. Armstrong.✠

LIMA—Lima Natural Gas Co. (160)
M.—E. R. Curtin; S.—E. L. Malone; N.—R. L. Lynch.

LORAIN—Citizens Gas & Elec. Co. (170)

MALTA—Malta & McConnelsville Gas Co.
M.—H. C. Hopp.✠

MANSFIELD—Logan Natural Gas & Fuel Co.

MANSFIELD—Mansfield Gas Lt. Co. (108)
M.—R. E. Burger; S.—J. L. Maloney; Bus. Mgr.—Jas. L. Stone; Sec.—R. A. Brooks.✪

MARIETTA—National Oil & Gas Co.✪
Pres.-M.—Jno. S. Archer✪; Sec.—C. B. Barry.✠

(Ohio—Continued)

MARIETTA—Permian Oil & Gas Co.✪
M.—Geo. White.✠

MARIETTA—River Gas Co.
Agt.—F. L. Reed; S.—A. P. Quinlan.✪

MARION—Marion Gas Co. (170)

MASSILLON—E. Ohio Gas Co. (Cleveland.)
L. M.—J. E. Foster.

MEDINA—Medina Gas & Fuel Co.✪
M.—J. C. McDowell.✪

MIDDLETOWN—Ohio Gas & Elec. Co.
G. S.—L. E. Marshall; S.—F. H. Buffington.✪

MILLERSBURG—Killbuck & Millersburg Oil & Gas Co.
M.—H. H. Church.✠

MOUNT VERNON—Upham Gas Co.
M.—D. A. Upham; S.—J. A. Upham; N.—S. P. Upham.

NEWARK—Consumers Gas Co.
M.—A. H. Heisey; Sec.—Geo. E. Graeser.✠

NEWARK—Newark Natural Gas & Fuel Co.
M.—L. F. Carl; S.—H. R. Rogers.

NEW BREMEN—New Bremen & Minster Gas Co.✪
M.—L. W. Kunning✪; Fred. E. Thiesing.✪

NEWCOMERSTOWN—Consolidated Gas Co.
M.—S. A. Stowe.✠

NEW PHILADELPHIA—E. Ohio Gas Co.
L. M.—W. H. Dimmick.

NORWOOD—Ohio Fuel Supply Co. (167)
Dist. S.—J. W. Tidball.

OBERLIN—Oberlin Gas & Elec. Co. (90)
M.—Paul M. Loewe.

PIQUA—Miami Valley Gas & Fuel Co. (167)

PORTSMOUTH—Portsmouth Gas Co. (152✠)

ST. MARY'S—Columbus Natural Gas Co.
(See Wooster, O.)

ST. MARY'S—St. Mary's Gas Co.

SALEM—Natural Gas Co. of W. Va.
S.—D. B. McCune.

SANDUSKY—Sandusy Gas & Elec. Co.
M.—E. A. Bechstein; S.—P. J. Wright.

SHILOH—Shiloh Gas Co.✠
M.—H. V. White; Sec.—A. W. Firestone.✠

SIDNEY—Ohio Fuel Supply Co. (167)

SPRINGFIELD—Springfield Gas Co. (140)
V. P.—G. M.—T. J. Jones✠; S.—E. D. Abbott; N.—C. G. Abbott.

TIFFIN—Logan Natural Gas & Fuel Co.✪
L. S.—H. R. Rogers.✪

TOLEDO—Northwestern Ohio Natural Gas Co.
M.—Jas. W. McMahon.

TROY—Ohio Fuel Supply Co. (167).

URBANA—Ohio Fuel Supply Co. (167)
L. M.—R. S. Pearce; A. M.—W. G. Arrowsmith.

UTICA—Utica Gas, Oil & Mining Co.
M.—H. L. Everts.✪

WAPAKONETA—Northern Ind. G. & [illegible] Co. (160)
L. M.—A. L. Whiteman.

WARREN—East Ohio Gas Co. (See Cleveland.)
L. M.—G. C. Lohr.

WASHINGTON—Washington Gas & Elec. Co.
M.—H. C. Estberg; S.—Jos. Gillespie.✪

WOODSFIELD—Central Gas Co.
M.—J. E. Keegan; H. D. Ogle.✠

WOODVILLE—Mauntler Bros. & Co.
M.—Geo. H. Mauntler.✠

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WOOSTER—Columbus Natural Gas Co.
M.—C. W. Sears; E.—Burt R. Bay; S.—Ira L. Neely.

YOUNGSTOWN—East Ohio Gas Co.
L. M.—W. M. Keenan.

ZANESVILLE—Ohio Fuel Supply Co. (167)
Dist. S.—H. H. Dreibelbis.

..... OKLAHOMA. .....

CHICKASHA—Chickasha Gas & Elec. Co. (46)—C & W
M.—F. D. Shaffer; E.—J. T. Thompson✪; H. D. Jenkins.✠✪

—Natural Gas Companies—

ADA—McThwaite Oil & Gas Co.✪
M.—H. D. Johnson.✠✪

ARDMORE—Ardmore Gas Co.
M.—P. C. Ekern; S.—J. F. Lawrence; N.—F. L. Blackburn.

BARTLESVILLE—Bartlesville Gas, Elec. & Ry. Co. (108)
M.—L. G. Coleman.

BARTLESVILLE—Bartlesville Gas & Oil Co. (108)
M.—W. H. Merritt; S.—D. G. Brandt; N.—G. B. Barnett.

BARTLESVILLE—Osage Producers Co.
M.—Frank F. Finney; Geo. Fox.✠✪

BARTLESVILLE—Quapaw Gas Co. (108)
M.—A. J. Diescher✪; H. H. Sloan.✠

BEGGS—Beggs Gas Co.✪ (88)

BLACKWELL—Blackwell Oil & Gas Co.
S.—G. W. Kite.✠

BOYNTON—Boynton Gas & Elec. Co. (Hdqrs. Muskogee, Okla.)
M.—Jno. H. Mosier✠; S.—J. B. Owens.

BRISTOW—Bristow Gas Co.
M.—Frank Barnes✠; S.—A. G. Richards.

CHANDLER—Oklahoma Fuel Supply Co. (See Tulsa.)
S.—W. W. Bruce.

CHECOTAH—Western Natural Gas Co. (See Tulsa.)✪
L. M.—H. G. Newcomb.✪

CHELSEA—Chelsea Natural Gas Co.
Fres.—F. E. Keith; Sec.-Treas.—J. W. True.

CLAREMORE—Caney River Gas Co.
G. M.—Glen T. Braden; A. G. M.—R. E. Alexander; A. A. Armstrong.✠

CLAREMORE—Oklahoma Fuel Supply Co.

CLEVELAND—Pioneer Gas Co.
M.—A. B. Moore.✪

COLLINSVILLE—Collinsville Gas Co.
M.—Earl Reasor.

CUSHING—Creek County Gas Co.
Pres.—W. J. Rowland; Sec.-Treas.—W. H. Tippett.

CUSHING—Cushing Gas Co.
M.—R. C. Jones; S.—Jas. J. McNeill.

DRUMRIGHT—Drumright Gas Co.
Prop.—J. G. Bennett.

(Oklahoma—Continued)

DUNCAN—Western Oklahoma Gas & Fuel Co. (108)
M.—E. E. Yingling.

DUSTIN—Eastern Oklahoma Gas Co.
G. M.—G. W. McFann.

EL RENO—El Reno Gas & Elec. Co.—C
M.—N. F. Garrison; E.—H. W. Steele.

ENID—Enid Elec. & Gas Co. (34✠)—W
M.—Lincoln Beerbower; S.—C. E. Rentchler; I.—H. M. Byllesby Co.

EUFALA—Western Natural Gas Co.✪ (See Tulsa.)
L. M.—J. H. Schuler.✪

GUTHRIE—Guthrie Gas Co.
M.—W. J. Dibbens.✠ (Pres.—M. B. Madden; Sec.—Paul Henderson, both of Chicago.)

HENRYETTA—Smith & Swan.
M.—J. B. Swan.✠

HOMINY—Hominy Lt. & Gas Co.✪
M.—Carl Mullendore.✪

KIEFER—Kiefer Light & Fuel Co.
M.—W. H. Sloat.✠

LAWTON—Lawton Natural Gas Co.
M.—F. M. Marple.✠

McALESTER—McAlester Gas & Coke Co. (85)—C
M.—Frederick A. Willard; E.—Theo. Veith.

MUSKOGEE—Grand River Gas Co.
M.—G. W. Fry.

MUSKOGEE—Municipal Pipe Line.
E.—Henry H. White.

MUSKOGEE—Muskogee Gas & Elec. Co. (34)
G. M.—J. F. Owens✪✠; E.—L. A. White; N.—F. A. Strasswey.✪

NEWKIRK—Kay County Gas Co. (See Ponca City, Okla.)
L. M.—George Murray.

NORMAN—Norman Gas & Pwr. Co.
M.—W. Porter Jones.

NOWATA—Nowata County Gas Co. (88)

OCHELATA—Ochelata Water & Gas Dept. Co.
M.—G. E. Schwartz.✪

OKLAHOMA CITY—Oklahoma Gas & Elec. Co. (34)
M.—W. R. Molinard; E.—H. M. Byllesby & Co. (Chicago); S.—Frank J. Meyer; N.—R. C. Leonard; H. Willmering.✪

OKLAHOMA CITY—Oklahoma Natural Gas Co. (See Tulsa.)

OKMULGEE—Okmulgee Gas Co.
M.—J. S. Clarke.

OKMULGEE—Southern Gas Co.
M.—J. T. King; S.—J. R. Page; W. C. Rollins.✠

PONCA CITY—Kay Co. Gas Co.
Pres.-M.—Geo. L. Miller✪; Treas.—J. J. McGraw; N.—D. W. Kygar.✠

POTEAU—Le Flore County Gas & Elec. Co.
M.—Howard N. Cassel.✠

PRYOR—Grand River Gas Co. (See Muskogee.)

RINGLING—Southwestern Public Service Co.

SALISAW—Grand River Gas Co. (See Muskogee.)

SAND SPRINGS—Sand Springs Gas Co.
M.—Chas. Page; S.—Geo. W. Kinney; Gen. Auditor—R. J. Guillan; Sec.—C. T. Tingley; S. F. McLeod.✠

SAPULPA—Central Lt. & Fuel Co.
M.—W. W. Jenkins.✪

SHAWNEE—Shawnee Gas & Elec. Co.
M.—C. S. Thompson✠; E.—J. H. Gillis✪; N.—C. H. Bishop.✪

SKIATOOK—Skiatook Gas Co.
Pres.—Jno. O. Mitchell.✠✪

STILLWATER—Stillwater-Pawnee Gas Co.
V. P.—O. A. Brewer.

TONKAWA—Kay County Gas Co. (See Ponca City, Okla.)
L. M.—J. Boyd.

TULSA—Caney River Gas Co. (See also Claremore).
P.-G. M.—G. T. Braden; V. P.-T.—R. H. Bartlett; Sec.—John C. Bartlett; A. S.-A. G. M.—R. E. Alexander; S.—H. E. Myers.

TULSA—Osage & Oklahoma Gas Co.
M.—R. H. Bartlett.

TULSA—Oklahoma Natural Gas Co.
Pres.-G. M.—G. T. Braden; A. G. M.—R. E. Alexander; S.—W. W. Bruce, Chandler, Okla.; S., Eastern div.—H. E. Myers; S., Western div.—F. R. McCarthy.

✪ ✪ ✪

TULSA—Western Natural Gas Co.
Pres.—O. K. Eysenbach; V. P.—G. C. Stebbins; Sec.-M.—E. T. Tucker✠; L. M.—Checotah, H. G. Newcomb; Eufala—J. H. Schuler.

VIAN—Vian Service Co.
Pres.—G. W. Fry, Muskogee, Okla.

VINITA—Vinita Gas Co.
M.—D. W. Battenfield.

WAGNER—Grand River Gas Co. (See Muskogee.)

WAURIKA—Consumers Lt. & Pr. Co.✪

..... OREGON. .....

✪ ✪ ✪

ASHLAND—Oregon Gas & Elec. Co. (10)—O
S.—Clifford Jenkins.

ASTORIA—Pacific Power & Light Co. (110)—O.
L. M.—J. B. Kilmore.

BAKER—East Oregon Light & Power Co.
M.—F. A. Harmon✠; E.—A. H. Kellog; N.—J. P. Lottridge.✠

EUGENE—Oregon Power Co. (34)—W
M.—H. A. Joslin; S.—W. A. Emery.

GRANTS PASS—Oregon Gas & Electric Co. (10)—O
S.—F. Gillfillan.

LAGRANDE—LaGrande Gas Co.
E.—J. U. McDonald.

MARSHFIELD—Oregon Power Co. (34)—O
Receiver — Elmer Dover✪; S. — Henry O'Meara.

MEDFORD—Oregon Gas & Elec. Co. (10)—O
M.—Fred. G. Guy.

PENDLETON—Pacific Power & Lt. Co. (110)
L. M.—F. W. Vincent; N.—R. S. Wells.

PORTLAND—Portland Railway, Light & Power Co. (110)—C

(Over)

(Oregon—Continued)

M.—W. M. Hamilton; E.-S.—H. H. Stanton.

PORTLAND—Portland Gas & Coke Co.—O. (Supplies Vancouver, Wash., Gladstone, Oregon City, and St. Joseph, Ore.).
M.—H. M. Papst; E.—E. L. Hall; S.—R. R. Ripley✪; N.—S. C. Bratton.

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ROSEBURG—Oregon Gas & Elec. Co. (10)—O
S.—O. R. C. Grew.

ST. Johns—St. Johng Gas Co.
M.—H. M. Papst; E.—E. L. Hall.

SALEM—Portland Railway, Light & Power Co.—C (See Hdqrs., Portland, Ore.)
M.—W. M. Hamilton; E.—H. H. Staunton; N.—E. W. Williams.

SPRINGFIELD—Oregon Power Co.✪
Receiver—Elmer Dover.✪

..... **PENNSYLVANIA.** .....

ALLENTOWN—Allentown-Bethlehem Gas Co. (160)
G. M.—J. A. Frick; E.—A. C. Taylor; N.—J. W. Crankshaw.

ALLENTOWN—Lehigh Navigation Elec. Co.
Pur. Agt.—W. R. Fehr.✠

ALTOONA—Altoona Gas Lt. & Fuel Co. (130)—W
S.—J. C. Rabold.

ARDMORE—Counties Gas & Elec. Co. (160)—W
M.—John L. Mather; S.—Howard Hoffman; N.—J. H. Potter.

ASHLAND—Ashland Gas Lt. Co.—O
M.—Edwin C. Price; E.—W. H. Grime.

ATHENS—Athens & Sayre Gas Co.—W
M.—O. L. Haverly.✠

AVONDALE—Kennett Gas Co.—W
G. M.—Jos. Mayer; S.—Jas. Austin✪; N.—Geo. Maloney.

BANGOR—Bangor Gas Co.—W
M.—Doris Hambright; S.—J. Beck.

BELLEFONTE—Bellefonte Gas & Steam Heating Co.—C
M.—H. S. Taylor.

BERWICK—Berwick Gas Co.—W

BETHLEHEM—Allentown-Bethlehem Gas Co. (160)—W
G. M.—J. A. Frick; S.—Edward Bradley.

BLOOMSBURG—Columbia Gas & Electric Co.—C
M.—S. C. Pohe; E.—S. G. Recque; S.—J. J. Barnick; N.—J. F. Richards; R. W. Coffman.✠

BOYERTOWN—Boyertown Gas Co.—W
G. M.—Irwin T. Ehst; S.—W. H. Engle.

BRISTOL—E. Penn. Gas & Elec Co. (172)—C
M.—D. A. Elias; E.—G. L. Bascome.✪

CARBONDALE—Carbondale Gas Co. (152)—W
S.—A. B. Scheer; E.—D. F. Burritt; N.—P. Mayberry.

CARLISLE—Carlisle Gas & Water Co.—W
S.—C. Faller.

CATASAUQUA—Allentown-Bethlehem Gas Co.
M.—Geo. W. Steele.

CHAMBERSBURG—Chambersburg Gas Co.—W
G. M.—M. K. Burgner; E.—John Woolf; W. G. Davidson.✠

CHESTER—Philadelphia Suburban Gas & Elec. Co. (142) C & W
G. M.—J. D. Shattuck; Ass't M.—Geo. W. Thomson; S. of M.—L. D. Huestis; S. of Mains—Chas. Wilde; S. of D.—Geo. W. Savage; S. of Coke Ovens—W. M. White.

CLEARFIELD—Penn. Public Service Co.—C
M.—Warren Partridge; S.—Chas. Brohl; N.—B. M. Fast.

COATESVILLE—Philadelphia Suburban Gas & Elec. Co. (142)—W
M.—N. B. Bertolette; S.—Owen Higgins; N.—Chas. Boyd.

COLUMBIA—Columbia Gas Co. (130)—W
M.—R. B. Hull; S.—M. A. Adams; N.—H. J. Von Nieda.

CONNELLSVILLE—Fayette County Gas Co.
S.—Jos. E. Angle. (See Uniontown.)

CONSHOHOCKEN—Counties Gas & Elec. Co. (160)—W
M.—R. E. Hecker.

DALLASTOWN—Suburban Gas & Fuel Co. of York Co.—W
M.—H. S. Dutton, Jr.✪; District M.—Geo. H. Taylor.✪

DANVILLE—Columbia Gas & Elec. Co.—C
S.—Geo. M. West.

DOYLESTOWN—Doylestown Gas Co. (145)—W
Dist. S.—Wm. Kane.

EAST GREENVILLE—Penn-Green Gas Co.
S.—R. H. Hendershott.

EASTON—Easton Gas Works. (114)—W
G. M.—R. B. Jennison; S.—E. G. Holzer; N.—J. Reiley.✪

ELIZABETHTOWN—Marietta & Elizabethtown Gas Co.—W
M.—Wm. M. Green; E.—Geo. W. Redseckeer; S. & N.—John R. Ebersole.

EMAUS—East Penn Gas Light Co.—W
S.—Chas. B. Rambo.✠✪

GETTYSBURG—Gettysburg Gas Co.—W
M.—A. B. Plank.

GIRARDVILLE—Girardville Gas Co. (149)—W
M.—Chas. R. Adams✪; S.—Claude Brecher✪ and John Marten✪; John G. Lowry.✠

HAMBURG—Hamburg Gas & Elec. Co.—W
M.—E. R. Schollenberger; S.—A. J. Althouse.✠

HANOVER—Conewago Gas Co.—W
M.—Edward E. Bair.✠

HARRISBURG—Harrisburg Gas Co. (130)—W
M.—L. S. Williams; S.—C. M. Cole; N.—P. H. Bailey.

HAZELTON—Luzerne Gas & Electric Co.—W
M.—W. H. James.

HONESDALE—Consolidated Light, Heat & Power Co.—W
S. and N.—F. H. Eisele.✠

HUNTINGDON—Penn Central Lt. & Power Co. (147)—W
G. S.—J. H. Shearer✪; S.—F. P. Duggan

(Pennsylvania—Continued)

(Lewistown); N.—H. B. Swayne; H. A. Crownover.✠

JENKINTOWN—Philadelphia Suburban Gas & Elec. Co. (157)—W
M.—L. R. Dutton✠; S.—Edw. Neiderer; N.—Wm. S. Fiss.

JERSEY SHORE—Jersey Shore Gas Co.—W.
Receivers—Jno. W. Livegood; Guy H. Davis; M.—S. G. Kintner; S.—H. Q. Staver.✪

KINGSTON—Luzerne Co. Gas & Elec. Co. (142)—W
M. E.—A. J. Llewellyn; N.—R. J. Halloran.✪

LANCASTER—Lancaster Gas Light & Fuel Co. (130)—W
M.—R. B. Hull; G. S.—H. W. Brubaker; S.—E. N. Potts✪; N.—H. J. Von Nieda; I.—Roy Preston.✪

LANSFORD—Girardville Gas Co. (149),
Hdqrs. 4014 Chestnut St. Philadelphia Pa.
G. M.—J. G. Lowry✠; G. S.—John Martin; N.—F. G. Handley.✪

LEBANON—Lebanon Gas & Fuel Co. (108)-C
M.—G. S. Speaker; E.—R. K. Havinghorst; N.—E. S. Palmer.

LEHIGHTON—New Parryville Consolidated Gas Co.—W
M.—A. T. Kemmerer.

LEWISBURG—Lewisburg Gas Co. (158)—W.
M.—Jas. P. Ruhl.

LEWISTOWN—Penn Central Light & Power Co.—(147)—W
S.—F. P. Duggan.

LITITZ—Lititz, Manheim & Ephrata Gas Co.
S.—Lloyd Shafer.

LOCK HAVEN—Lock Haven Gas Co.
G. M.—W. S. Harris✠; S.—Henry Cue.✪✠

LYKENS—Williamstown Gas Co.—W
See Kingston, Pa.
M.—C. E. Clark.✪

MAUCH CHUNK—Mauch Chunk Gas Co.—W.
M.—E. Causbrook.

McKEESPORT—McKeesport Gas Improvement Co.—C
V. F.-G. M.—T. V. Salt; S.—C. F. Kallstedt.

MECHANICSBURG—Mechanicsburg Gas & Water Co.—W
S.—H. L. King.✠

MIDDLETOWN—Dauphin County Gas Co. (160)—W

MILTON—Northumberland Co. G. & E. Co. (174)—C
(See Williamsport, Pa.)

MOUNT CARMEL—Mount Carmel Gas Light Co.—W
M.—John Wightman.

MOUNT JOY—Donegal Gas Co.—W
S.—P. F. Schock.✠

MYERSTOWN—Myerstown Gas & Fuel Co.—W
M.—John J. Witman, 503 Penn st., Reading, Pa.; E.—W. W. Risser; S.—C. M. Long.

NANTICOKE—Luzerne Co. Gas & Elec. Co. (142) (See Kingston.)
M.—T. F. Ferguson; N.—H. H. Doak.

NAZARETH—Interurban Gas Co. (114)—W
M.—R. D. Jennison✪; S.—E. G. Holzer; E.—J. S. M. Wharton.

NEWTOWN—Bucks County Pub. Service Co. (145)
M.—G. W. Rogers.

NORRISTOWN—Counties Gas & Elec. Co. (150)—W
M.—H. H. Ganser; E.—H. B. Bryans; I.—R. D. Donaldson.

NORTHUMBERLAND—Northumberland Gas Co.—W
M.—G. C. Gochnauer, Harrisburg, Pa.; S.—Thos. Gannon.

OXFORD—Citizens Gas & Fuel Co.
S.—H. P. Passmore; S.—Harry Kent.✪

PALMYRA—Annville & Palmyra Gas & Fuel Co.—W
M.—J. F. Jones.

PARKESBURG—Parkesburg Gas Co.—W
M.—C. F. Cattell✠; S.—C. R. Cattell; N.—R. M. Cattell.

PEN ARGYL—Pen Argyl Gas Co.—W
M.—C. M. Smith✠; S.—John Saltern.

PHILADELPHIA—Northern Liberties Gas Co. (160)—C—3rd and Brown streets.
S.—J. M. Ruegenberg; E.—H. C. Dean; N.—W. J. Irvin.

PHILADELPHIA—Philadelphia Gas Works.
G. S.—T. H. Jackson✪; E.—W. H. Gartley and W. J. Serrill; N.—J. B. Myers; J. A. eFarson.✠

PHILADELPHIA—Philadelphia Suburban Gas & Elec. Co. (157)—W
Executive Offices: West Washington Square. See Chester, Pa., for operating department.

PHOENIXVILLE—Phila. Suburban G. & E. Co. (142)—C
L. M.—H. B. Atkin.✪

PITTSBURGH—Consolidated Gas Co.✪
G. M.—Jos. Guffy; S.—R. W. H. Young✪; N.—S. B. Stewart.✪

PITTSTON—Peoples Light Co.—W
S.—Thomas Henshall.✠

POTTSTOWN—Philadelphia Suburban Gas Co. (157)—W
D. M.—A. P. McCarthy; S.—J. W. Lynch✪; N.—Wm. James.✪

POTTSVILLE—Pottsville Gas Co. (146)—W.
M.-N.—J. J. McKnight.✠

QUAKERTOWN—Highland Gas Co.—W
M.—H. H. Ganser✠; E.—Thomas Lewis; S.—W. A. Dietterick.

READING—Consumer's Gas Co. (160)—W
M.—J. H. Keppelman; E.—Geo. B. Bains; N.—C. Calhoun Smith.✪

RED LION—Suburban Gas & Fuel Co. of York Co.—W (See Dallastown.)
S.—Geo. C. Althouse.

RENOVO—Renovo Consolidated Gas Co.—W
G. M.—Thos. Gilchrist; E.—John Woolf✪; N.—L. R. Evarts.

SCRANTON—Hyde Park Gas Co.—W
S.—E. M. Stack.✠

(Pennsylvania—Continued)

SHAMOKIN—Pennsylvania Lighting Co.—W
M.-S—J. A. Britton✠; N.—J. H. B. Yeaton.

SHENANDOAH—Shenandoah Light, Heat & Power Co.—W
G. M.—J. S. Wise, Jr.; S.—Peter McCarron; N.—Charles Hodge; Edward Hughes, 437 Chestnut St., Philadelphia.✠

SHIPPENSBURG—Shippensburg Gas & Electric Co.—W
S.—C. W. Harmon.✠

SLATINGTON—Slatington Gas Co.—W
S.—Winfield Roper.✠

STEELTON—Dauphin County Gas Co. (160)—W

STROUDSBURG—Citizens Gas & Elec. Co.—W
M.—A. A. Holbrook✠; E.—Floyd Le Bar; S.—John Hansell.

SUNBURY—Northumberland Co. Gas & Elec. Co.—W
G. M.—S. C. Pohe; S.—Geo. W. Beck.

TAMAQUA—Eastern Penna. Lt., Htt. & Pr. Co.—W
M.-N.—H. H. Thompson.

TOWANDA—Towanda Gas Co.—C
S.—E. L. Smith.✠

TYRONE—Tyrone Gas & Water Co.—C
S.—J. C. Sims; Pres.—A. A. Stevens.✠

UNIONTOWN—Fayette County Gas Co.
E.—F. L. Gerard; S.—J. E. Angle.

WAYNE—Counties Gas & Electric Co.
M.—John L. Mather.

WAYNESBORO—Waynesboro Gas Light Co.—W
E.—H. W. Bailey; S.—F. R. Bender.✠

WEST CHESTER—Chester County Gas Co. Co. (142)—W
M.—W. O. Lamson, Jr.✪

WILKES-BARRE — The Wilkes-Barre Co. (130)—W
G. M.—E. A. Wakeman✠; S.—F. A. Kelly; N.—A. J. Jackson.✪

WILLIAMSPORT—Northern Central Gas Co. (174)—W
M.—W. R. Rhoades✠; Sec.—W. C. Runyan; Treas.—J. P. Gage; N.—Geo. B. Hodges; Pres.—J. F. Hepburn.

WILLIAMSTOWN—Williamstown Gas Co.—W
M.—B. S. Woodman; E.—Jas. Sargeant.

YORK—York Gas Co.—W
M.—Oscar H. Heckert; S. of D.—H. S. Bair; S. of M.—Collin Beegle; N.—Jno. A. Weiser.

—Natural Gas Companies—

ALTOONA—Peoples Natural Gas Co. (See Pittsburgh.)

AMBRIDGE—Ambridge Gas Co.
Sec.—F. C. Schroeder.✠

BRADFORD—Manufacturers Gas Co. (170)
M.—E. P. Whitcomb; E.—L. C. Amey; G. S.—A. A. Crawford; Agent—S. D. Weaver.

BRADFORD—City of Bradford Gas & Power Corp.
F. & G. M.—C. D. Warren✪; S.—M. V. Enwright.✪

BRADFORD—Potter Gas Co.✪
M.—E. B. Reeser.✪

BROCKPORT—Elk & Jefferson Gas Co.✪
M.—Chas. H. Brennan.✠

BUTLER—Independent Natural Gas Co.
Pres. and Mgr.—T. W. Phillips, Jr.✠; Sec.-Treas.—B. D. Phillips; S.—W. D. Beach✪; E.—J. B. Mandeville.

CLARION—Clarion Gas Co.
M.—Raymond Cross; S.—W. P. Craig.

CABOT—Godfrey L. Cabot Gas Co.✪

CLARION—Home Gas Co.
M.—M. M. Kaufman; S.—A. J. McCleary.

CLARION—Tri-County Natural Gas Co.
Asst. to Pres.—G. E. Wearing; E.—S. J. McCartler; S.—D. M. Davis, Jr. (See also Pittsburgh.)

CROSBY—Heineman Gas Co.
M.—W. H. Gallup.

ELDRED—Eldred Home Gas & Fuel Co.
M.—E. A. Barden.✠

EMLENTON—Union Heat & Lt. Co.
M.—T. B. Gregory.✠

ERIE—Pennsylvania Gas Co.

FRANKLIN—United Natural Gas Co.
(See Oil City, Pa.)

FREEPORT—Cumberland Gas Co.
M.—Bernard Way.✠

GLENSHAW—Glenshaw Natural Gas Co.
M.—J. C. Titzel.

GREENVILLE—Greenville Natural Gas Co.
M.—F. W. Stone.✠

HAZELHURST—Hazelhurst Gas Co.
M.—S. C. Beers.✠

INDIANA—Laurel Oil & Gas Co.
M.—H. H. McFann.✪

JOHNSONBURG—Consumers Gas & Heat Co.
M.—W. D. Clearwater.

JOHNSTOWN—Johnstown Fuel Supply Co.
M.—P. J. Morrissy.

KANE—Citizens Gas Co. and Kane Gas Lt. & Htg. Co.
M.—Thos. L. Kane; S.—J. A. Benston; N.—C. C. Davis.

KANE—McDade Gas Co.✪
M.—W. W. McDade.✪

KARNS CITY—Troutman Oil & Gas Co.✪
M.—Geo. E. McGill.✠

KITTANNING—Mfrs. Natural Gas Co. of Armstrong County.
M.—Jas. T. Hellman.✠

KUSHEQUA—Mt. Jewett Gas Co.
M.—Elisha K. Kane✠; S.—G. V. Thompson.

LEECHBURG—Gilpin Natural Gas Co. (168)
M.—John W. Crosby; Sec.—L. N. Bush.✠

MASONTOWN—Masontown Gas Co.
M.—W. L. Graham.✠

MEADVILLE—United National Gas Co. (122)
L. M.—Frank L. Fairchild.

MERCER—Mercer Gas Light & Fuel Co.
M.—W. R. Miller.✠

MERCER—New Wilmington Gas Co.
M.—W. R. Davis, Mercer, Pa.✠; S.—V. L. Johnson.

(Pennsylvania—Continued)

MONACA—Crescent Oil & Gas Co.✪
M.—Frank Lackey✪; Sec.—A. V. Langbund.✪✠

MONONGAHELA—Bellwood & Monongahela Natural Gas Co.
Theo. M. Byers.✠

NEWCASTLE—Mfrs.' Lt. & Heat Co. (166)
L. M.—J. T. Campbell.

NEW WILMINGTON—New Wilmington Gas Co.✪
M.—W. N. Hovis, Mercer, Pa.

OIL CITY—Alum Rock Gas Co.
M.—H. J. Slicker, Knox, Pa.✠; S.—Howard-K. Dieterich.

OIL CITY—United Natural Gas Co. (122)
M.—Raymond Cross; E.—T. R. Weymouth; S.—J. F. Mason; Lynn Holbrook.✠

PITTSBURGH—Allegheny Heating Co. (168)
G. M.—Jos. F. Guffey; J. H. Reed, Jr.✠

PITTSBURGH—American Natural Gas Co.
M.—H. Wittmer.✠

PITTSBURGH—Carnegie Natural Gas Co.
Pres.—M. Clemson.

PITTSBURGH—Equitable Gas Co.✪
G. M.—Jos. Guffey✪; J. H. Reed, Jr.✠

PITTSBURGH—Greensboro Gas Co.✪
Sec.-Treas.—C. W. Baker.✪

PITTSBURGH—Hope Natural Gas Co.
G. M.—Jno. G. Pew; E. and G. S.—H. C. Cooper; V. P.—Jno. B. Corrin; R. A. Johnson.✪✠

PITTSBURGH—Jantha Lt. & Fuel Co.
M.—E. B. Reeser✪; S.—Edw. Kagey.✪

PITTSBURGH—Manufacturers Lt. & Heat Co.
G. M.—T. O. Sullivan; E.—J. F. Nestor; G. S.—John J. Foley (Canonsburg, Pa.); A. G. S.—R. W. Hay; N.—H. A. Quay.

PITTSBURGH—Octo Oil Co.
(Owns natural gas plants at Cadiz, Flushing and New Athens, O.)

PITTSBURGH—Ohio Fuel Supply Co. (See Columbus, O.)
G. M.—J. M. Garard; E.—F. H. Crawford; S.—J. M. Curry. (See also Columbus, O.)

PITTSBURGH—Pennsylvania Fuel Supply Co.
M.—G. F. Hughes.

PITTSBURGH—Peoples Natural Gas Co.
V. P.—Jno. G. Pew; G. S.—L. F. Barger; S. of Lines—F. L. Hadley; R. A. Johnson✠; N.—A. P. Davis.

PITTSBURGH—The Philadelphia Company.
Pres.—J. H. Reed; G. M.—J. F. Guffey; Pur. Agt.—J. H. Reed, Jr.

PITTSBURGH—River Gas Co.✪, 424 6th Ave.
G. M.—John G. Pew; R. A. Johnson.✠

PITTSBURGH—Taylorstown Natural Gas Co.✪
Pres.—J. J. Buchanan✪; Sec.—G. C. Jolly.✪

PITTSBURGH—Tri-County Natural Gas Co.
Pres.—H. Alexander Dean; V. P. & M.—Geo. E. Wearing.✪

PITTSBURGH—Union Natural Gas Corpn.✪
G. M.—E. P. Whitcomb✪; A. G. M.—A. A. Armstrong.✠

RIDGWAY—Ridgway Light & Heat Co.
M.—C. H. Law.✠

ROCHESTER—Mfrs.' Lt. & Ht. Co. (166)
L. M.—J. W. Hunter.

ROULETTE—Mountain Gas Co.
M.—W. G. Van Kuren.

ST. MARYS—St. Marys Gas Co.
G. M.—G. C. Simons; S.—Phillip Dixon.✠

SMETHPORT—Smethport Gas Co.
S.—Louis E. Sterrett.✠

TIONESTA—Tionesta Gas Co.
M.—J. R. Clark; E.—C. A. Wagner.

UNIONTOWN—Fayette County Gas Co.
S.—Jos. E. Angle.

WARREN—Pennsylvania Gas Co. (122)
G. M.—J. B. Crawford; G. S.—Raymond Cross; S.—C. T. McCalmont; E.—D. O. Leary (Roystone, Pa.)

WARREN—Warren & Chautauqua Gas Co. (170)
M.—E. P. Whitcomb.✠ S.—Thomas B. Clawson; N.—W. J. Broder.✠

WASHINGTON—Franklin-Washington Gas Co. (166)
M.—H. C. Ross.

WAYNESBURG—Waynesburgh Home Gas Co.
M.—C. E. Dittman.

WILCOX—Clarion Natural Gas Co.
S.—L. T. Lawson; Sec.—Arthur Johnson.

..... RHODE ISLAND. .....

BRISTOL—Bristol Gas & Elec. Co.—W
M.—A. B. Lisle; S.—A. G. Earle; N.—E. R. Davenport.✪

NEWPORT—Newport Gas Light Co.—C & W
M.—A. K. Quinn.✠

PAWTUCKET—Pawtucket Gas Co. (74)—C.
M.—Wm. McGregor✪; S.—Wm. Otten, Jr.✪

PROVIDENCE—Providence Gas Co.—C & W
Pres.—Jno. R. Freeman✪; S. of M.—Thos. H. Hintze; N.—A. A. Higgins.✪

TIVERTON—Tiverton Gas Co.
M.—Wm. E. King.✠

WESTERLY—Westerly Lt. & Power Co.—W
G. M. & N.—M. H. Spellman✠; S.—F. N. Clark.

WOONSOCKET—Blackstone Valley Gas & Elec. Co. (7)—C & W
M.—Gardner Rogers; S.—R. W. Perkins; N.—H. J. Pettengill, Jr.

..... SOUTH CAROLINA. .....

ANDERSON—Anderson Gas Co.—W
M.—W. R. Wones.✠

CHARLESTON—Charleston Consolidated Ry. & Ltg. Co. (160)—W
M.—G. H. Waring; S.—E. C. Kollock; N.—C. M. Benedict.✠

COLUMBIA—Columbia Ry., Gas & Elec. Co.—W
M.—Alfred Wallace✪; S.—S. W. Brown; N.—D. W. Pratt.

FLORENCE—Florence Gas Co.—W
M.—J. L. Barringer, Jr.; E.—John Richter.

GEORGETOWN—Georgetown Gas & Elec. Co. (153)—W
M.—S. Smith.

GREENVILLE—Southern Public Utilities Co.—W

(South Carolina—Continued)

L. M.—Jas. McCabe; S.—R. B. Carpenter✪; N.—H. E. McDonald.

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ROCK HILL—Rock Hill Gas Co. (154)—W
M.—E. R. Guard; S.—John L. Bost✪; E. & Pres.—J. D. Shattuck, Philadelphia.

SPARTANBURG—So. Car. Lt., Pr. & Ry. Co.—C
G. M.—F. H. Knox; S.—Alex. Wyness, Jr.

SUMTER—Sumter Gas & Power Co. (192)
S.—E. E. Austin; N.—Arthur A. Crelnar.

..... SOUTH DAKOTA. .....

ABERDEEN—Aberdeen Gas Co.—W
M.—C. A. Howard; E.—O. C. Stokke; N.—R. I. Hill.✠

DEADWOOD—Peoples Gas Co.— C & W
M.—E. S. Davidson.

DELL RAPIDS—Dell Rapids City Gas Wks.—W
M.—Arthur J. Smith.

GETTYSBURG—Gettysburg Gas Co.
M.—Wm. E. Marshall.

HURON—Huron Lt. & Power Co.—W
M.—Frederic D. Brown.

MITCHELL—Mitchell Power Co. (90)—W
M.—E. J. Sherwood.

RAPID CITY—Rapid City Gas Light Co.
Recvr. & M.—F. P. Hooper; S.—H. E. Millen.

SIOUX FALLS—Sioux Falls Gas Co. (160)—W
S.—A. S. Graham; E.—H. C. Gross; N.—C. L. Howie; Adv. M.—G. B. M. Medearis.

WATERTOWN—Watertown Gas Co.—W
M.—H. S. Fletcher✠; S.—Chas. Hirzel.

YANKTON—Yankton Lt. & Heating Co.—W
M.—Chas. Smith.✠

..... TENNESSEE. .....

BRISTOL—Bristol Gas & Elec. Co. (108)—C
M. & S.—S. M. Vance; N.—R. E. Landers.

CHATTANOOGA—Chattanooga Gas Co. (86)—C & W
M.—S. E. DeFrese✠; S. Wks.—H. D. Boyle; N.—E. H. Parish.✪

CHATTANOOGA—Chattanooga Gas & Coal Products Co.✪
S.—J. G. Hartman.✪

CLARKSVILLE—Clarksville Gas Co. (132—Ky. Pub. Service Co.)—C
G. M.—H. D. Fitch; S.—H. M. Mason.

JACKSON—Citizens Gas Lt. Co.—C
M.—L. D. Spragle; N.—R. P. Jernigan.

JOHNSON CITY—Washington County Gas Co. (79)—W & C
M.—E. J. Wagner✪; S.—J. E. Hensley✪; N.—J. H. Crouch.✪

KNOXVILLE—Knoxville Gas Co. (108)—C & W
G. M.—A. W. Young✪; G. S.—Walter Coakley; N.—Luther Gaston.

MEMPHIS—Memphis Gas & Elec. Co.—W
M.—J. F. Ramier✠; S.—H. P. Roth.

NASHVILLE—Nashville Gas & Heating Co. (160)—C
G. M.—S. E. Linton; E.—W. M. Africa✪; N.—P. J. Naschold✪; L.—J. E. Hoge.✪

..... TEXAS. .....

AMARILLO—Amarillo Gas Co.—W
M.—F. J. Storm; N.—W. B. McSpadden.✪

AUSTIN—Austin Gas Lt. Co. (32)—C & W
M.—A. T. Knies✠; S.—Wm. Lawler, Jr.; N.—F. Fugate.

BEAUMONT—Beaumont Gas Lt. Co. (38)—W
M.—M. T. Walker✠; S.—T. C. Buchanan. N.—S. L. Barrow.

BRENHAM—Empire Oil & Gas Co. (of Bartlesville, Okla.)—W
M.—W. I. Doan✪; S. & N.—J. J. Campbell✪; E—H. P. Ball.✪

BROWNWOOD—Texas Pr. & Lt. Co. (178)—O
M.—W. P. Murphy.

CENTER—Texas Gas & Elec. Co.✪
L. M.—E. H. Davis.✪

CLEBURNE—Texas Pr. & Lt. Co. (178)—C
L. M.—W. E. Gooch.

CORPUS CHRISTI—Corpus Christi Gas Co. (82✠).
M.—F. E. Newbury;✪ E.—H. L. St. John; N.—A. E. Beach.

DALLAS—Texas Pr. & Lt. Co. (178✠)—O
G. M.—F. R. Slater; E.—E. B. Nelswanger; N.—H. Jalonick; J. D. Oliger.✠

EL PASO—El Paso Gas Co.—C & W
M.—K. L. Simons✠; S.—L. G. Greer; I.—W. A. Beckett.

GALVESTON—Galveston Gas Co.—W
V. P. & M.—Fred M. Lege, Jr.; E. & S.—L. H. Barnes✪; S.—Paul E. Nicholas; N.—W. I. Stark.

GREENVILLE—Greenville Gas Co.—W
M.—C. S. Burger; S.—John Starnes; N.—

HOUSTON—Houston Gas & Fuel Co. (64) (130)
M.—F. D. Murphy; S.—Theo. Miller; N.—Harry E. Danner.✪

MINERAL WELLS—Empire Oil & Gas Co. (144)—W
L. M.—J. J. Campbell.

PALESTINE—Palestine Light, Heat & Power Co. (32)—W
M.—W. H. Clifford; S.—H. F. Levy; N.—C. S. Meison.

PARIS—Texas Power & Light Co. (178✠)—W
M.—W. N. Munroe; S.—P. M. Rotherum; N.—H. V. Applebaugh.

PORT ARTHUR—Port Arthur Gas Co. (109)—W
M.—W. E. McClintock✪; S.—A. W. Jackson✪; N.—S. B. Redmond✪; Sec.—C. M. Scott✪; Treas.—Ralph Madison.✪

SAN ANGELO—San Angelo Gas Co.—O
M.—John Freeland.

SAN ANTONIO—San Antonio Pub. Serv. Co. (105)—W
M.—W. B. Tuttle; S.—F. L. Weisser; N.—W. G. Morgan; R. Henson.✠

SHERMAN—Sherman Gas Lt. & Fuel Co.—W

(Texas—Continued)

M.—W. M. Chaffin, Jr.✠; S.—Geo. W. McDonald.

TEMPLE—Temple Gas Light Co. (82✠)—W
M.—J. D. Utley; N.—E. E. Duffield.

TYLER—Tyler Gas Co.✪
M.—G. M. Moran.✪✠

WAXAHATCHIE—Waxahatchie Gas Co. (82)—W
S.—J. R. Ellis.✪

WEATHERFORD—Crystal Ice Co.—W
M.—John H. Prince✠; E.—G. Wilbanks.

—Natural Gas Companies—

ABILENE—Abilene Gas and Electric Co.
M.—F. A. Matthes; S.—Clarence Osburn.✪

ATLANTA—Atlanta Gas Co.
M.—W. E. Sipe.

CISCO—Cisco Gas & Elec. Co.
M.—C. B. Snodgrass; E.—I. M. Meyers.

CORSICANA—North Texas Gas Co.
L. M.—H. J. Robbins.

DALLAS—Dallas Gas Co.
M.—H. C. Morris; Sec.—R. G. Soper; S.—D. D. Taylor; J. W. Wrede.✠

DENISON—North Texas Gas Co.
G. M.—C. B. McKinney; Treas.—J. B. McCabe.

DENISON—Texas Pr. & Lt. Co. (178)
M.—P. A. Rogers.

DENTON—North Texas Gas Co.

FORT WORTH—Fort Worth Gas Co.
M.—O. K. Shannon; S.—J. H. Stinson; Sec.—J. L. McCown.

FORT WORTH—Lone Star Gas Co.
M.—W. P. Gage; R. W. Sterrett.✠

GAINESVILLE—Gainesville Gas & Elec. Co. (32)
M.—W. E. Milne.

GROESBECK—Herring Oil & Gas Co.✪
M.—R. L. Underwood.✠

HENRIETTA—Henrietta Oil & Gas Co.
M.—M. A. Eaton.

LAREDO—Border Gas Co.
M.—M. P. Cullinan; S.—E. H. Kline.

MARSHALL—Marshall Gas Co.
M.—W. H. Sedberry.✠

MART—Mart Gas Co.
M.—E. B. Reeser.✪

McKINNEY—North Texas Gas Co.
M.—J. M. Meyer.✪

MEXIA—Little Giant Oil & Gas Co.
M.—A. E. Wilder.

MEXIA—Mexia Oil & Gas Co.
M.—T. McKenzie✪; S.—E. J. Anderson.

PARIS—Texas Pr. & Lt. Co.
L. M.—W. N. Munroe.

SANTA ANNA—Santa Anna Gas Co.
M.—W. L. Woodward.

SHERMAN—North Texas Gas Co.
Agt.—F. M. Kenny.

TEAGUE—Texas Pipe Line & Gas Co.
M.—J. J. Potts.

TEXARKANA—Southwestern Gas & Elec. Co. (38)
M.—W. L. Wood, Jr.; S.—L. K. Whitehead; N.—W. S. James; W. E. Bann.✠

VERNON—Vernon Gas Co.✪
M.—M. W. Bahan✪, Box 983, Ft. Worth, Tex.

WACO—Texas Gas Co.
M.—E. B. Reeser.

WACO—Texas Power & Light Co. (178✠)—W
M.—F. L. Booth; E.—C. M. Thompson.

WICHITA FALLS—North Texas Gas Co.
Agt.—H. P. Hodge.

..... UTAH. .....

OGDEN—Utah Pr. & Lt. Co. (109)—C
M.—P. M. Parry.

PROVO—Utah Valley Gas & Coke Co.—C
G. M.—A. F. Beringer; S. of D.—S. A. Stum; N.—J. M. Vick and Walter Adams.

SALT LAKE CITY—Utah Gas & Coke Co. (84)—C & W
V. P.—C. M. Benedict✪; G. M.—Geo. H. Waring✪; S.—E. F. Aldridge; N.—E. A. Angley; L.—W. H. Fairbanks.

..... VERMONT. .....

BARRE—People's Lighting, Heating & Pr. Co.—W
G. M.—A. W. La Fountain✪; S. and N.—J. M. Nelson.

BENNINGTON—Twin State Gas & Electric Co. (46✠)—W
M.—E. E. Larrabee.

BRATTLEBORO—Twin State Gas & Electric Co. (46✠)—W
G. M.—Howard L. Olds; E.—Jno. L. Ordway; N.—E. F. Kelly; A. D. Foster✠; L. M.—W. H. Richardson✪; S.—E. M. Smith.

BURLINGTON—Burlington Lt. & Power Co. (142)—W
M.—F. H. Parker; Ass't M.—D. W. Jardine.

MONTPELIER—Montpelier & Barre Lt. & Pr. Co.—C
M.—Geo. L. Blanchard✪; S.—H. C. Smith.✪

RUTLAND—Rutland Railway, Lt. & Power Co. (114)—C & W
G. M.—F. S. Nicholson; S.—W. H. Lawson✠; N.—H. N. Eastman.

ST. ALBANS—St. Albans Gas Light Co.—W
M.—Geo. S. Butler.✠

ST. JOHNSBURY—St. Johnsbury Gas Co.—W
S.—Chas. L. O'Loughlin.✠

SPRINGFIELD—Springfield Gas Co.—W
M.—W. O. White✪; E.—G. Goodrich.✪

..... VIRGINIA. .....

ALEXANDRIA—Alexandria Gas Wks. (Municipal)—C
S.—F. W. Latham.✠

CHARLOTTESVILLE—Charlotttesville Gas Works.—C
G. M.—A. V. Conway✪; S. M.—H. M. Hantzmon.✠

DANVILLE—Gas Department (Municipal)—C
S.—Frank Talbott.✠

FREDERICKSBURG—City Gas Works—C
M.—R. Stuart Royer.

(Over)

(Virginia—Continued)

GRAHAM—Graham Gas Co.✪
S.—Frank Talbott.✪

HAMPTON—Newport News & Hampton Ry., Gas & Electric Co. (134)—W
M.—J. M. Shannahan; S. & E.—J. Bowdoin Cocke✪; W. Stewart.✠

LYNCHBURG—Lynchburg Traction & Light Co.
G. M.—Jno. W. Hancock✠; S.—W. G. Clayton✪; N.—C. C. Hogshead.

NEWPORT NEWS—Newsport News and Hampton Ry., Gas & Electric Co. (134)—C & W
G. M.—E. F. Peck; S.—J. Bowdoin Cocke.✪

NORFOLK—City Gas Co. of Norfolk—C & W
G. M.—T. Norman Jones; S.—W. G. Von Gemmingen.✪

PETERSBURG—Petersburg Gas Co. (142)—C & W
M.—R. A. Goudy✠; S.—B. E. Thompson✪; N.—W. E. Talbot.

PORTSMOUTH—Portsmouth Gas Co.—C & W
G. M.—B. B. Ferguson.✠

RICHMOND—Henrico County Gas Co. (192)—W
V. P. & G. M.—L. I. Pollitt; S.—Geo. W. Rhoades.

RICHMOND—Richmond Gas Works—C & W
S.—W. P. Knowles.✠

ROANOKE—Roanoke Gas Lt. Co. (148)—C & W
M.—W. J. McCorkindale✪; S.—James Baines✪; N.—W. A. Bannatyne✪; W. R. Bradley.✠

STAUNTON—Staunton Gas Co.—W
M.—Carl Riddleberger✪; E. F. Mandeville.✠

SUFFOLK—Suffolk Gas-Elec. Co. (192)—W
E.—A. C. Howard✪; S.—Geo. F. Kindley.✪

WINCHESTER—Winchester Gas & Elec. Co.—C
M.—Jno. H. Cunningham; S.—J. F. Goss.✠

..... **WASHINGTON.** .....

ABERDEEN—Grays Harbor Gas Co. (180)—C
G. M.—N. S. Burcombe; S.—H. A. Hessig.

AUBURN—Valley Gas Co.✪
Prop.—Eugene Kuehne.✪

BELLINGHAM—Puget Sound Traction, Lt. & Pr. Co. (74)—C
M.—L. R. Coffin; S.—C. C. Clauson; N.—R. W. Lindley; E. L. Noyes.✠

BREMERTON—Bremerton-Charleston Lt. & Fuel Co. (180).
S.—W. G. Martin; N.—Wm. F. Sachtleben.

CENTRALIA—North Pacific Public Service Co. (180)—C
M.—M. C. Hancock✠; S.—F. W. Olsen.

EVERETT—Puget Sound Gas Co.—W
M.—R. C. Coffy✠; S.—W. W. Flanders; N.—J. F. Milner.

HOQUIAM—Grays Harbor Gas Co. (See Aberdeen.)
L. M.—J. Augustin; N.—Harry Kidd.

NORTH YAKIMA—Pacific Power & Light Co. (110)—C
L. M.—Geo. C. Sawyer; N.—J. E. Davidson.

OLYMPIA—Olympia Gas Co. (34)—C & W
M.—Elmer Dover, Tacoma; L. M.—J. G. Bourus.✪

PORT TOWNSEND—Key City Lt. & Pr. Co.—C
G. M.—J. M. Kinkaid.✠

SEATTLE—Seattle Lighting Co. (38)—C & W
M.—F. K. Lane; S.—S. E. Hutchinson✪; N.—S. R. Hutchinson.

SPOKANE—Spokane Gas & Fuel Co (108)—C & W
M.—A. F. Travers; S.—R. B. Stitzer; N.—C. G. Allenbach.✠

TACOMA—North Pacific Gas & Elec. Co. (180)
M.—F. C. Brewer.✪

TACOMA—Tacoma Gas Co. (34)—C & W
M.—Elmer Dover; S.—W. A. Leuenberger.

VANCOUVER—Pacific Pr. & Lt. Co. (110)—O
G. M.—J. E. Davidson, Portland, Ore.; E.—H. H. Schoefield, Portland; N.—C. R. Young; L. S.—J. T. Urquart.✪

WALLA WALLA—Pacific Pr. & Lt. Co. (110)—C
S.—C. S. Walters.

WENATCHEE—Central Washington Gas. Co.—W
M.—Geo. D. Brown; S.—W. R. Thomas; S. of Mfre.—J. B. Long; N.—L. M. Shreve; I.—J. B. Long✪; R. C. Kennedy.✠

—Natural Gas Companies—

WALLA WALLA—Walla Walla Oil, Gas & Pipe Line Co.✪
Treas.—Henry D. James.✪

..... **WEST VIRGINIA.** .....

BLUEFIELD—Bluefield Gas & Pr. Co. (192)—C
M.—J. C. Nichols.✪

CHARLES TOWN—Charlestown Gas & Water Co. (156)—W
S. and Receiver—Leon H. Ware.✠

CLARKSBURG—Clarksburg Gas & Electric Co.
S.—Lew Peck; R. T. Lowndes.✠

MARTINSBURG—Martinsburg Gas Co. (156)—W
(Same as Charleston.)

—Natural Gas Companies—

BRIDGEPORT—Bridgeport Natural Gas & Oil Co.
M.—D. H. Gawthrop.✠

CAMERON—Mfrs.' G. & E. Lt. Co.
M.—H. E. Beigle.✠

CHARLESTON—Hamilton Natural Gas Co.
M.—J. C. Blair.

CHARLESTON—United Fuel Gas Co.
G. S.—H. A. Wallace.

CLARKSBURG—Clarksburg Lt. & Ht. Co.
M.—H. M. Brown.✪

CLARKSBURG—Home Gas Co.
M.—T. C. White; E.—J. J. Hooper; N.—Charles Long.

CRAWFORD—Rural Gas Co.
M.—E. G. Davisson.

(West Virginia—Continued)

DAVIS—W. Va. & Md. Gas Co.✪
M.—H. V. Thomas; F. B. Tracy.✠

DUNBAR—Charleston-Dunbar Natural Gas Co.
M.—Paul B. Grosscup; N.—W. T. Moore.

ELKINS—West Virginia Central Gas Co. (102)
S.—J. C. Cunningham.

FAIRMONT—Monongahela Valley Traction Co.
S. of Gas—F. B. Pryor.

GASSAWAY—Gassaway Gas Co.
M.—A. Wellwood, Sutton, W. Va.

GRAFTON—Pittsburgh & W. Va. Gas Co. (168)
M.—J. H. Reed, Jr., 435 Sixth Ave., Pittsburgh.

HARRISVILLE—Henaghan & Hanlon Heat & Lt. Co. (Headquarters at Sistersville, W. Va.)
M.—Ed. L. Dearolph.✠

HUNTINGTON—Huntington Development & Gas Co.
G. M.—John J. Nash.✠

LUMBERPORT—Lumberport Gas Co.✪
M.—J. H. Hornor.✪

MILTON—Harshbarger Oil & Gas Co.
M.—I. J. Harschbarger.✠

MORGANTOWN—Randall Gas Co.
M.—Walter H. South✠; S.—A. T. Casto.

MORGANTOWN—West Virginia Traction & Elec. Co.
M.—J. K. Buchanan; E.—D. F. Dusenberry.

NEW CUMBERLAND—New Cumberland Water & Gas Co. (166)

PENNSBORO—West Virginia Heat & Light Co.
M.—H. J. Scott.

PIEDMONT—W. Va. & Md. Gas Co.
S.—C. C. Culbertson.

POINT PLEASANT—Point Pleasant Natural Gas Co.✪

SALEM—Salem Natural Gas Co. (102)
M.—H. V. Thomas.

SHINNSTON—Home Petroleum and Natural Gas Co.
G. M.—O. L. Nay.✠

SHREWSBURY—Montgomery Gas Co.✪
M.—Herman Moore.✪

SISTERVILLE—Reno Gas Co.

SUTTON—Light, Fuel & Pr. Co. of W. Va.
M.—A. Wellwood.✠

WESTON—Keener's Oil & Natural Gas Co.
M.—Geo. I. Keener.✠

WEST UNION—West Union Gas Co. (102)
M.—H. V. Thomas.

WHEELING—City & Suburban Gas Co.
M.—J. D. Whittemore; E.—D. F. Dusenberry; S.—I. Tuttle; J. H. McVeigh.✠

WHEELING—Mfrs' Lt. & Ht. Co. (166)
L. M.—H. B. Freeman.

WHEELING—Natural Gas Co. of W. Va.
Sec.-Treas.—W. A. Sprenkle.✪

..... **WISCONSIN.** .....

ANTIGO—Antigo Gas Co.—W
S.—H. B. Strong; W. G. Maxey.✠

APPLETON—Wisconsin Traction, Lt., Heat & Pr. Co. (48)—C & W. (Also supplies Neenah and Menasha.)
N.—C. Tippet.

ASHLAND—Ashland Lt., Pr. & St. Ry. Co.—O
G. M.—A. E. Appleyard; S.—M. F. Juhl✠; Gas M.—Fred Englund.

BARABOO—Wis. Pr., Lt. & Ht. Co. (51)
S.—Geo. R. Blakesley.

BEAVER DAM—Beaver Dam Fuel & Light Co.—W
M. & S.—E. A. Beule; S.—J. P. Gerg.✪

BELOIT—Beloit Water, Gas & Elec. Co.—
V. P. & G. M.—B. F. Lyons; E. & G. S.—R. G. Krumrey; N.—E. L. Moorman.

BERLIN—Wis. Pr., Lt. & Ht. Co. (51)—C
Div. S.—E. B. Heimbach.
M.—O. C. Irwin; S. & N.—S. W. Irwin.

BURLINGTON—Citizens Gas Co.—W
M.—E. F. Rakow.✠

CHIPPEWA FALLS — Wisconsin - Minnesota Light & Power Co. (84)—W
D. M.—Holmes Ives.

EAU CLAIRE—Wisconsin-Minnesota Light & Power Co. (84)—C
D. M.—A. R. Manley; S.—John Henning✪; N.—L. S. Myers.✪

FOND DU LAC—Eastern Wisconsin Ry. & Lt. Co. (84)—C & W
G. M.—R. H. Smith (Sheboygan); S. of Gas Dept.—A. G Carson; N.—Frank H. Evans.✪

FORT ATKINSON—Fort Atkinson Gas Co.—W
M.—Chas. De Forest.

GREEN BAY—Green Bay Gas & Elec. Co.—(182) C
G. M.—C. R. Phenicie; S.—H. E. Frazer and J. A. Hathaway; N.—C. M. Alford; L. O. Landaas.✠

HUDSON—St. Croix Gas Co. (34)—C
G. M.—H. C. Cummings; S.—Frank Hardwick.

HURLEY—Hurley Gas Co. (135)—W
M.—Thos. Lawler; S.—Oscar Johnson.

JANESVILLE—New Gas Light Co. (160)—W
S.—I. F. Wortendyke; N.—G. B. M. Medearis.

KENOSHA—Wisconsin Gas & Elec. Co. (126)—C & W
G. M.—G. H. Cook; N.—J. B. Crawford.

LA CROSSE—Wisconsin-Minnesota Lt. & Pwr. Co. (84)—C & W
M.—P. D. Kline; E.—Harry Nettum; S.—F. Featherly; N.—Norman Olson.✪

MADISON—Madison Gas & Elec. Co. (105)—W
M.—John St. John✪; G. S.—Walter C. Beckjord; E.—Chas. Hyel✪; John Corscot, Jr.✠

MANITOWOC—Manitowoc Gas Light Co. (83)—C
M.—J. Peter Eastman; E.—W. D. Birbeck; S.—John Skubal; N.—Harry Kirkpatrick.

(Wisconsin—Continued)

MENOMONIE—Menomonie Gas Co. (135)—W
S.—J. H. Dawes; E.—Wm. Buss.

MILWAUKEE—Milwaukee Coke & Gas Co.
M.—Jno. W. Shaeffer.

MILWAUKEE—Milwaukee Gas Light Co. (105)—C & W
G. M. & E.—R. B. Brown; E.—R. P. Kraft; N.—Guy F. Gregg; I. E.—Bruno Rahn; Adv. M.—R. O. Jasperson; Henry Harman.✠

MONROE—Monroe Lt. & Fuel Co.—W
M.—H. W. Johonnott.✠

OSHKOSH—Oshkosh Gas Lt. Co.—C & W
M.—Wm. Wallen✠; S.—L. Christiansen; N.—Geo. Fitzgerald.

PLATTEVILLE—Platteville Gas Co.—C
M.—Wm. C. Butterworth✠; S.—O. R. Henning, Jr.✪; N.—Thos. Butterworth.

PORTAGE—Portage American Gas Co. (142)—C
M.—A. S. Quackenbush.

RACINE—Wisconsin Gas & Elec. Co. (126)—C & W
G. M.—D. E. Callender✠; N.—M. W. Everett.

RHINELANDER—Oneida Gas Co.—W
M.—W. E. Vaughn; Pres.—Dr. A. B. Daniels.✠

RIPON—Ripon Light & Water Co.—O
M.—W. E. Haseltine✠; E.—A. Guenther; S.—Frank Buelow; A. M.—W. A. Exner.

SHEBOYGAN—Sheboygan Gas Light Co. (182)—C & W
M.—Arthur F. Davey; E.—H. L. Rice; S.—R. Grabowsky; N.—Chas. A. Pepper.

STEVENS POINT—Wis. Valley Elec. Co.—C & W
S.—A. H. Sikes; N.—H. G. Quandt.

STOUGHTON—Stoughton Light & Fuel Co.—W
G. M.—A. N. Thompson✠; E.—A. H. Enger.

SUPERIOR—Gas Appliance Co.
Pres. & Treas.—C. W. Andrews; N.—H. J. Harvey.

SUPERIOR—Superior Water, Lt. & Power Co.—C
G. M.—W. H. Winslow; S.—W. C. Lounsbury; N.—C. D. SeCheverell.

WATERTOWN—Wisconsin Gas & Elec. Co. (126)—C
M.—A. C. Babson.

WAUKESHA—Waukesha Gas & Elec. Co. (142)—C
M.—Geo. Boetler✪; S.—G. Seabold; N.—G. Gorgan; R. E. Smith.✠

WAUSAU—Wausau Gas Co.✪—C
M.—H. H. Wilson.✪

..... **WYOMING.** .....

CHEYENNE—Cheyenne Lt., Fuel & Pr. Co (24)—C
M.—C. A. Semrad; S.—L. C. Phillips.✪

LOVELL—Lovell Gas & Elec. Co.
M.—R. E. Richardson.

SHERIDAN—Sheridan Gas Co.
M.—Jno. T. Bacon.✠

..... **CUBA.** .....

HAVANA—Havana Elec. Ry., Lt. & Power Co.
G. M.—Frank Steinhart; E.—D. Lombills Clark.

..... **REPUBLIC OF PANAMA.** .....

PANAMA—Panama & Colon Gas Companies (159)—O
Prop.—Starr & Reed (Morris Bldg., Philadelphia, Pa.); E.—S. P. Vecker (Morris Bldg., Philadelphia, Pa.)

..... **PORTO RICO.** .....

PONCE—City of Ponce Gas Co.
M.—Wm. A. Tobias.

SAN JUAN—Porto Rico Gas Co.—C
New York Office—30 Broad St.
M.—R. M. Redding; S. of Plant—A. S. Robinson; S. of Dis.—Wm. A. Tobias; N.—Geo. H. Joy.

..... **HAWAII.** .....

HONOLULU—Honolulu Gas Co., Ltd.
M.—E. O. Cannon✪; S.—W. J. Hampton.

SOUTH HILO—South Hilo Gas Co.
S.—E. J. Smith.✪

..... **PHILIPPINE ISLANDS.** .....

MANILA—Manila Gas Corp'n—C
M.—E. Odrich; E.—B. Vierick; S.—H. Hoffman and O. Rother.

LEADING CANADIAN OPERATING GAS COMPANIES.

BRANDON—Canada Gas & Elec. Corp.✪
G. M.—G. A. Paterson.✪

VICTORIA, B. C.—Victoria Gas Co.

VANCOUVER, B. C.—Vancouver Gas Co.
M.—Geo. Kidd✪; E.—John Keillor✪; N.—Chas. Bair.✪

BRANDON, MAN.—Brandon Gas & Power Co.

WINNIPEG, MAN.—Winnipeg Elect. St. Ry. Co.

HALIFAX, N. S.—Nova Scotia Tramways & Pr. Co.
M.—H. R. Mallison; S.—W. H. Soper; N.—J. L. Charlton.

HAMILTON, ONT.—Dominion Natural Gas Co.

HAMILTON, ONT.—United Gas & Fuel Co.
M.—F. V. Byrnes; E.—Geo. F. Goodnow and Henry I. Lea (Chicago); S. of Meters—W. P. Faye; S. Nat. Gas—M. S. Byrnes.

OTTAWA, ONT.—Ottawa Gas Co.

SHETLAND, ONT.—Shetland Gas Co.—N.✪
M.—E. Dobbyn.✪

MONTREAL, QUE.—Montreal Lt. Ht. & Pr. Co.
M.—J. S. Norris; E.—H. E. Mann; S.—F. R. Lawler✪; N.—W. B. Johnson; I.—C. D. Symmins.

CHATHAM, ONT.—Union Natural Gas Co.

ST. JOHN'S, N'F'DL'D.—St. John's Gas Lt. Co.

Dallas
East St. Louis
Indianapolis
Boston
Brooklyn
New York
Baltimore
Atlanta
Buffalo
Grand Rapids
Birmingham
Los Angeles
Milwaukee
Minneapolis
Newark
New Orleans
Norristown
No. Kansas City
Omaha
Philadelphia
Pittsburgh
Portland
Memphis
Seattle
Toledo
San Antonio
Oklahoma City
Salt Lake City
St. Louis
Trafford
Emeryville, Oakland, Cal.
Utica
Worcester
Ft. Wayne
Houston
Elizabeth
Springfield
Savannah
Albany
Washington
Tulsa
Louisville
E. Chicago
Duluth
Detroit
Denver
Dayton
Davenport
Columbus
Cleveland
Cincinnati
Chicago
Chattanooga

Linde

Interlocking Service Stations Form a Chain from Coast to Coast

Twenty-one of these links represent producing plants with manufacturing units of varying capacities—depending on the requirements in their respective districts. The other thirty-eight links represent LINDE warehouses which distribute Linde Oxygen to users in their respective districts.

All of these links are strongly interlocked by our policy of utilizing the resources of all to maintain the standard of service we endeavor to render from each and every one.

Together the new links added in the past year represent an outlay of several million dollars.

Our plans for further extensions of this service chain during the coming year call for an even greater expenditure.

These expenditures include, of course, the cost of the several hundred thousand new cylinders ordered for delivery during this period.

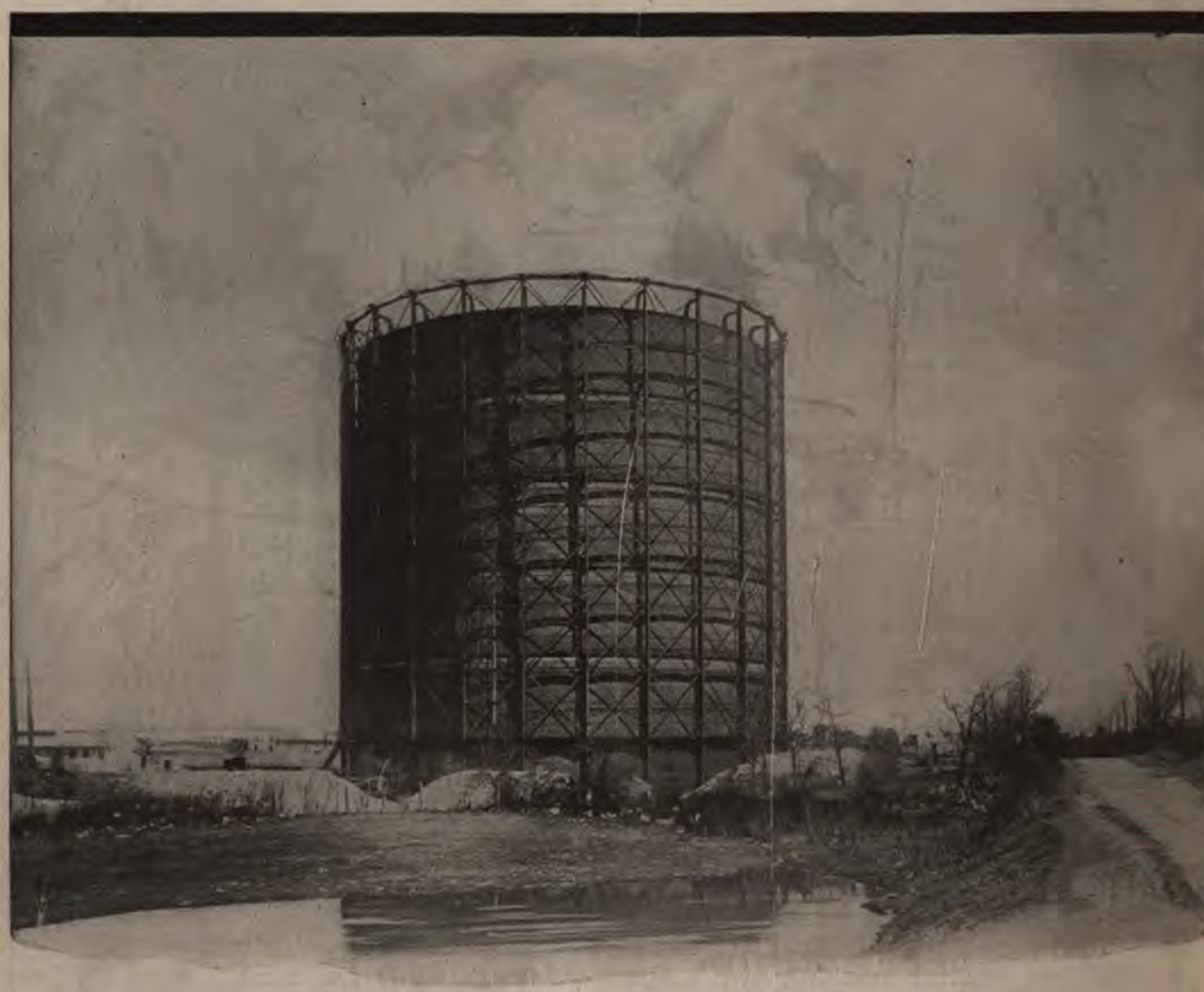
And this constant endeavor to maintain and expand our service through enormous investment and effort has had a direct bearing on the factory output of every user of oxygen in this country.

The Linde Air Products Company

"Largest Producers of Oxygen in the World"

30 East 42nd Street New York City

Those who read ads profit as well as those who insert them.



ONE OF TWO TEN MILLION (10,000,000) CUBIC FEET CAPACITY

GAS HOLDERS

BUILT BY

THE BARTLETT HAYWARD CO.

BALTIMORE NEW YORK

ADVERTISERS' INDEX PAGE 4

SINGLE COPIES, 25 CENTS

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. 12. NO. 2 CHICAGO JULY 25, 1917

The GAS RECORD

THE GAS MAN'S NEWSPAPER

VHA

Order

LIBERTY GLOW

Now

It is the new copper reflector gas stove (odorless) that fits in any fireplace. Can be sold as a portable. Standard specifications, Armco rustless iron, made in two sizes, retails for less than $10, gas consumption 3 to 30 cu. ft. an hour, safety first front burner; with or without andirons. To reduce costs, no salesman will call this season. Order samples now, limited stock going fast.

LIBERTY GLOW . . . COLUMBUS, O.

Prepare your company for Greater Gas Sales

Every Garage in your city represents a possible increase in annual gas sales of at least $25.00 each.

4—Facts—4

(1) A ready made market. (2) A standard approved appliance. (3) An Educational and Sales Plan for your salesmen. (4) An inquiry producing Advertising Campaign direct to your customers. These four essential requirements are bound to WIN.

Enlist the services of Scientific Co-operation and "Make Every Garage in the City Pay You A Dividend"

Ask for the plan.

The Scientific Heater Company

Cleveland **Ohio**

Those who read ads profit as well as those who insert them.

INDEXED

INDEX FOR VOLUME 11 OF THE GAS RECORD INSERTED IN THIS ISSUE.

VOL. 12. NO. 3 CHICAGO AUGUST 8, 1917

The GAS RECORD

THE GAS MAN'S NEWSPAPER

Concrete is cheaper than steel for purifiers

Get our proposition

STEERE ENGINEERING COMPANY

DETROIT, MICH.

OUR SUCCESS IN THE WAR is dependent upon a sufficient supply **BENZOL and TOLUOL** for the manufacture of **HIGH EXPLOSIVES.**

YOU CAN HELP YOUR COUNTRY.
WE CAN HELP YOU.

Separating and Refining Stills are required to produce the high purities demanded. We build Continuous and Non-Continuous Column Stills adapted to this class of work, and suggest for your consideration two types now extensively used.

STANDARD STILL

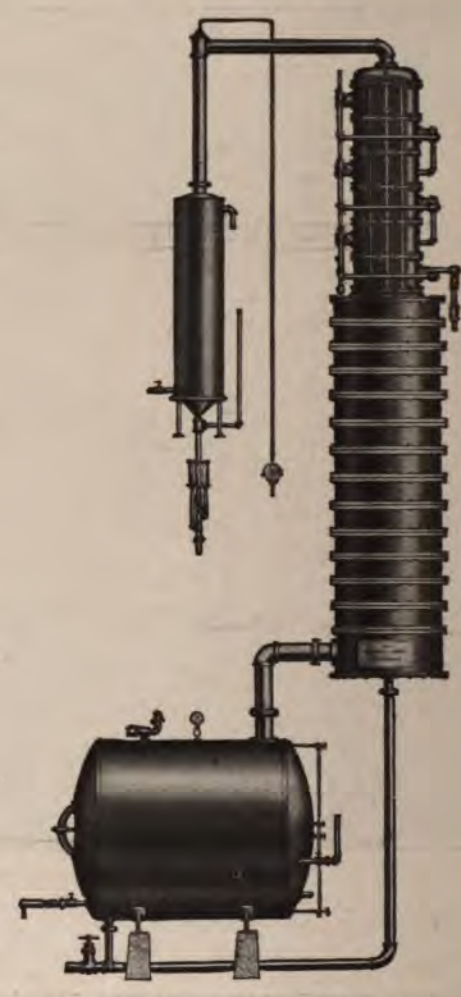
This type of apparatus will produce high grade Benzol or Toluol. The STILL is equipped with the necessary safety devices, and the steam coils are so constructed as to eliminate any trouble due to leaks. The COLUMN, equipped with Lummus Patent Vaporizing Hoods, the External Dephlegmator and Final Condenser are well proportioned, one with respect to the other, thus insuring maximum efficiency possible with this type of apparatus.

LUMMUS STILL

For the manufacture of the very highest grade Benzol Pure, or where great economy of steam and condensing water is essential, we recommend our BENZOL STILL with Lummus Patent Internal Dephlegmating System as illustrated in this advertisement.

Either type of apparatus is made in **standard sizes.** This insures **prompt deliveries,** careful construction, attention to details and a **real service to the customer.**

That these STILLS have been installed by many plants throughout this country now turning out large yields of high grade products, is reason why YOU SHOULD INSTALL LUMMUS APPARATUS if you contemplate manufacturing Benzol or Toluol.



Lummus Benzol Still with Internal Reflux System.

DISTILLING, CONDENSING, REFINING and RECOVERY PLANT APPARATUS

THE WALTER E.

LUMMUS

173 Milk Street **COMPANY** **Boston, Mass.**

Those who read ads profit as well as those who insert them.

Tech

L. 12. NO. 4 CHICAGO AUGUST 22, 1917

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The GAS RECORD

THE GAS MAN'S NEWSPAPER

VHA

GAS

ENGINEERS
AND CONTRACTORS

COAL GAS, NATURAL GAS
CLEAN PRODUCER GAS

SPECIAL FURNACE DESIGN IN CONNECTION WITH THE SUBSTITUTION OF PRODUCER GAS FOR NATURAL GAS AND OIL

STEERE ENGINEERING COMPANY
DETROIT, MICH.

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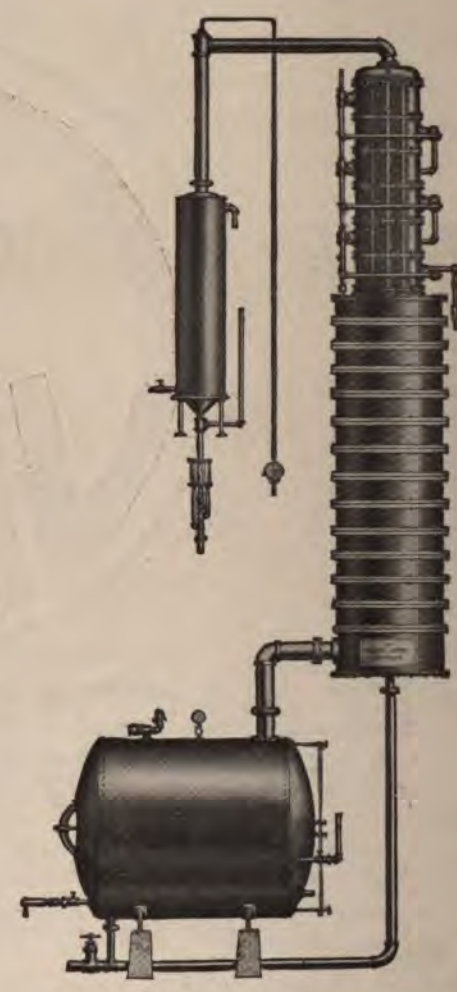

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THE WALTER E.

LUMMUS

173 Milk Street **COMPANY** **Boston, Mass.**

L. 12. NO. 5 CHICAGO SEPTEMBER 12, 1917

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The GAS RECORD

THE GAS MAN'S NEWSPAPER
SEMI-MONTHLY $2.00 A YEAR

HIGH EFFICIENCY

Hot Air House Heating Furnaces

Dual Fuel Gas-Coal Furnace

Safety Gas Garage Heater

Direct Gas—Auxiliary Gas—Auxiliary Coal—Gas and Coal, Dual Fuel. A size and style for every need. Fair in price, economical to operate.
For use with Artificial or Natural Gas.

A Safe, Fool Proof Gas Garage Heater

Definite detailed new business campaign layout furnished upon request

Coal Auxiliary attached to Gas Furnace

WRITE
Now
for
Prices
and
Particulars

Gas Auxiliary attached to Coal Furnace

The Gas Appliance Company

713 Frankfort Ave. W., Cleveland, Ohio

F. R. Hutchinson, Sales Mgr.

LINDSAY THORIUM

Safeguards the Future of American Gas Lighting

To insure uniform quality and prompt deliveries —to make sure of a permanent supply—insist on mantles made of

LINDSAY THORIUM

The manufacture of high-standard LINDSAY THORIUM and CERIUM NITRATES was established at a time when the gas mantle industry was in bitter distress—at a time when war had created a famine in such materials.

Today, we are making prompt shipments of quality material to most mantle makers of the United States and its allies — and our sales and facilities increase each month. Incandescent mantle makers and users can depend on LINDSAY THORIUM and CERIUM NITRATES.

We Are In the Business to Stay Against All Competition

Lindsay Light Company

CHICAGO

L. 12. NO. 6 CHICAGO SEPTEMBER 26, 1917

The GAS RECORD

THE GAS MAN'S NEWSPAPER

SEMI-MONTHLY $2.00 A YEAR

A Valve for Every Requirement

Prompt Shipment

STEERE ENGINEERING COMPANY, Detroit, Mich.

OUR SUCCESS IN THE WAR is dependent upon a sufficient supply of **BENZOL and TOLUOL** for the manufacture of **HIGH EXPLOSIVES**

YOU CAN HELP YOUR COUNTRY.
WE CAN HELP YOU.

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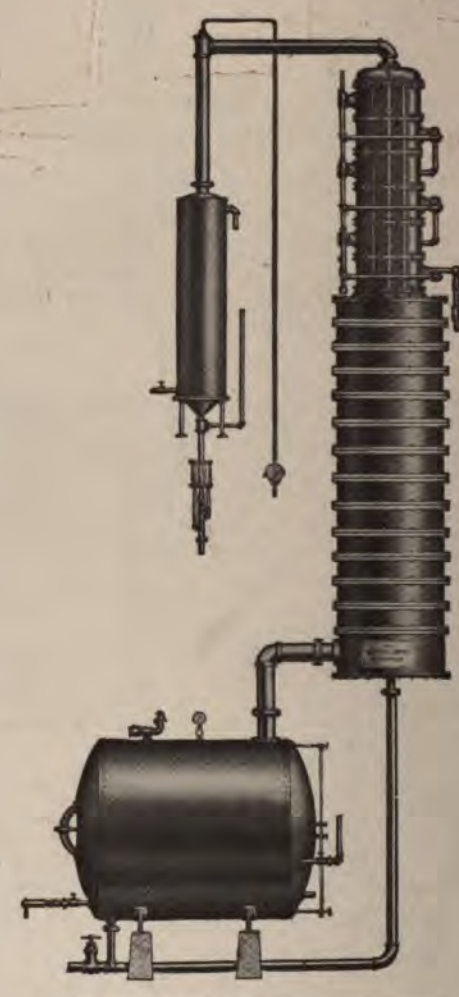

Lummus Benzol Still with Internal Reflux System.

DISTILLING, CONDENSING, REFINING and RECOVERY PLANT APPARATUS

THE WALTER E.

LUMMUS

173 Milk Street **COMPANY** **Boston, Mass.**

OL. 12. NO. 7 CHICAGO OCTOBER 10, 1917

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The GAS REC

THE GAS MAN'S NEWSPAPER

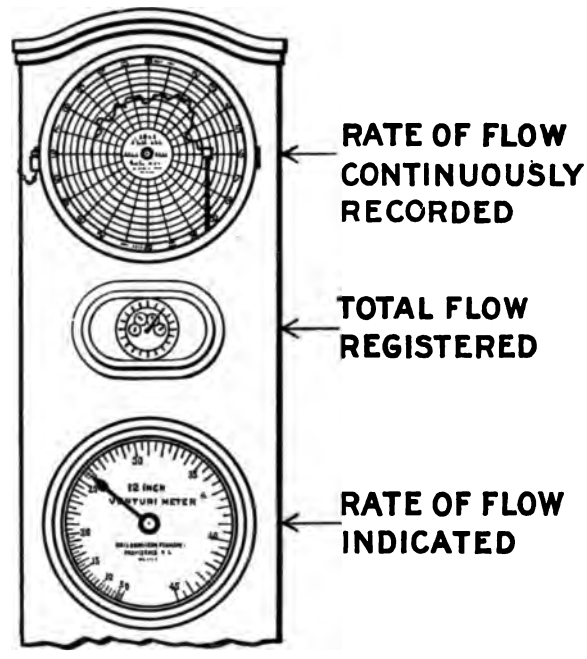
Member
lit Bureau of Circulations

Member
Associated Business Papers

SEMI-MONTHLY $2.00 A YEAR

THE VENTURI METER PAGE

"Three times the information at one-tenth the cost"



Three Kinds of Information Furnished

The above cut shows the three dials of the Venturi Type Q Register-Indicator Recorder. The middle dial registers the total amount of gas which has passed through the Venturi Meter Tube, located in the gas main.

The upper dial makes a continuous record of the flow on a 12-inch circular paper chart. The whole story of each 24 hours' operation of the plant is indelibly written on the chart. The value of this record for present inspection and future reference will be obvious to any gas plant manager.

The lower dial indicates the momentary rate of flow of the gas. It is 30 inches in circumference with coarse graduations. The operators in charge of the gas-making apparatus have found it of exceedingly great value in watching the "make."

You will note the middle or register dial alone gives the same information as the ordinary drum type station meter. Yet this is a very inexpensive meter and is recommended by the "people who know" in the gas business.

Bulletin No. 86-H contains complete information. May we send you a copy?

Builders Iron Foundry, Providence, R. I.

"BUILDERS OF THE VENTURI"

BRANCH OFFICES—25 Church St., New York City; Oliver Building, Pittsburgh, Pa.; The Rookery, Chicago, Ill.; N. B. Livermore & Co, Merchants National Bank Building, San Francisco, Cal.; Northwestern Equipment Co., Northwestern Bank Building, Portland, Ore.; Allen General Supplies, Ltd., Toronto, Canada.

OL. 12. NO. 8 CHICAGO OCTOBER 24, 1917

The GAS REC

Member
it Bureau of Circulations

THE GAS MAN'S NEWSPAPER
SEMI-MONTHLY $2.00 A YEAR

Member
Associated Business Papers

Flexible as a Giant Whiplash!

500 Feet of 4-Inch

"NATIONAL" ROTARY PIPE

Blown Out of the Well!

Wonderful Experience at Ada Bell Oil Company Well No. 2, Hunters Lease, Batson, Texas

"This well was 2,000 feet deep, when they commenced to pull out the pipe to change the bit. They had all the pipe out of the ground except 26 lengths when the gas began to show up. They screwed the swivel in the pipe to try and hold the pressure down, but the gas got the best of them and blew the pipe completely out of the well WITHOUT MAKING A SIGN OF A BREAK IN A SINGLE JOINT OF THE 26 LENGTHS.

"The swivel on top of the pipe struck the ground about 75 or 80 feet from the bottom of the derrick. The rest of the pipe continued to elbow right on through the side of the derrick, making a loop, or in other words, just like cracking a whip. The bit landing farthest from the derrick was in the neighborhood of 350 feet from the swivel. This is the most marvelous thing that I have ever seen in the oil fields, and has caused considerable talk among oil drillers in South Texas Oil Fields."

Extract from letter describing the picture shown

¶You've read the story. You've looked at the picture. **Now think over the significance of this "NATIONAL" performance.**

¶In one word, it means QUALITY. Quality of material—Quality that is shown in the marvelous FLEXIBILITY of the wrought steel in this pipe, and the unexcelled TENSILE STRENGTH in every **inch** of it. Note this—after this racking test there wasn't a flaw in the 500 FEET of this "NATIONAL" Rotary Pipe.

¶"NATIONAL" Quality is not **chance**—it is a regular part of every inch of the pipe. It will pay you to get "NATIONAL" pipe on account of this Quality.

¶Years and years may pass on your work before the "NATIONAL" pipe will ever be put to a test like this—if it **ever** is. But there's wonderful satisfaction—and PROFIT—in having a pipe that CAN stand up successfully **when the test comes.**

¶And this pipe is "NATIONAL"—the pipe that withstands the **tensile** and **twisting** and **corrosion** test in ordinary and **extraordinary** service—and **proves** it can. In whatever field you use pipe, "NATIONAL" will meet your requirements.

NATIONAL TUBE COMPANY

General Sales Offices, Frick Building, Pittsburgh, Pa.

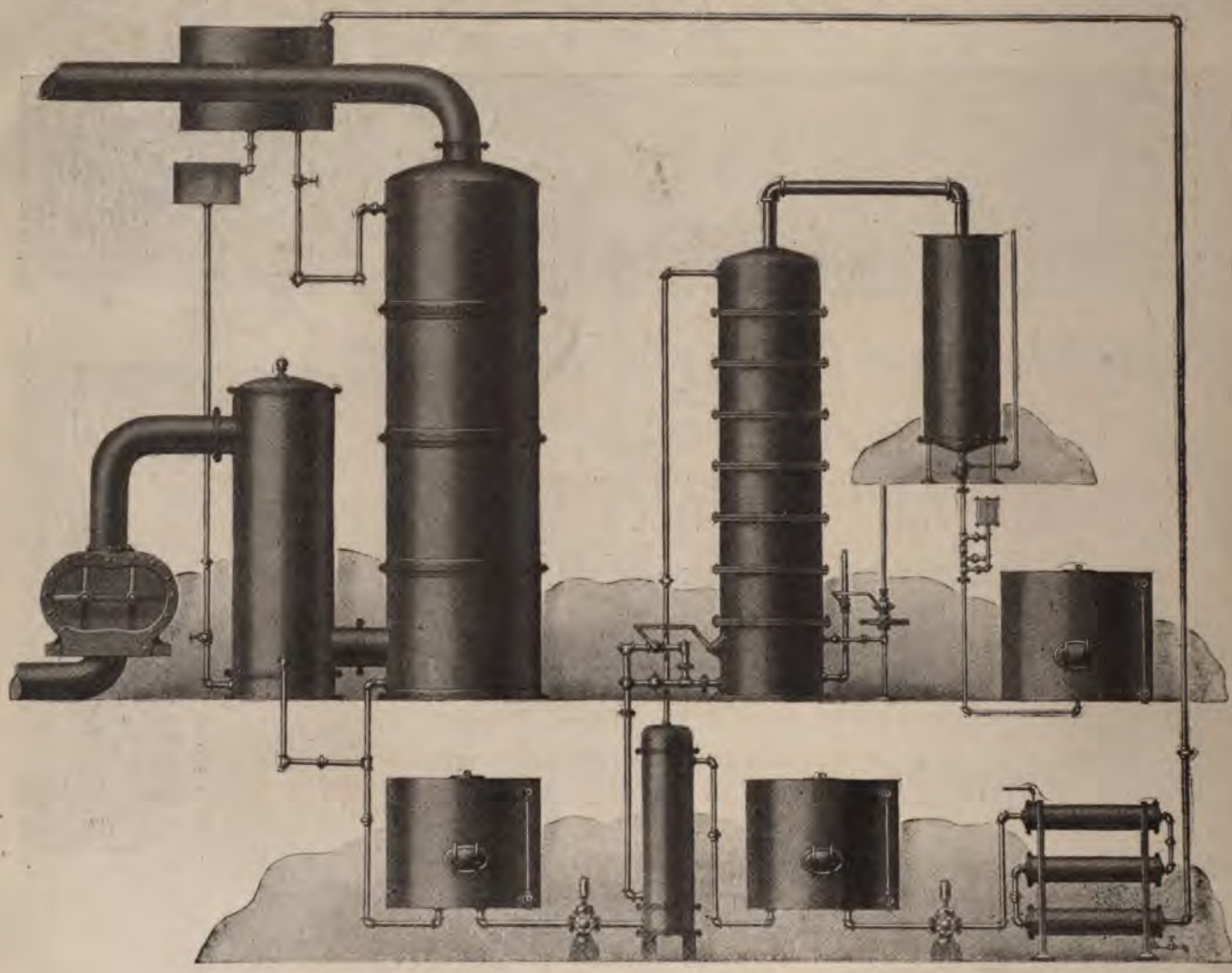
DISTRICT SALES OFFICES IN THE LARGER CITIES

Our Government Wants Your Toluol

THE LUMMUS ABSORPTION SYSTEM

INSURES

High Recovery from Gas and Purity Required for Explosives



Direct Recovery of Light Oils from Gas

The recovery of Benzol, Toluol, etc., directly from retort oven gases, without the intervention of condensing and re-distilling operations, greatly cheapens and simplifies their manufacture in quantities. The apparatus and processes employed are susceptible of adaptation to the largest scale of manufacture, are more flexible of control and hence better suited to selective recovery, and are cheaper to build and to operate than the cumbersome equipment and laborious processes which they have superseded.

The Lummus Continuous System, for direct recovery of Light Oils, is reduced to simple elements of pre-coolers, Absorbing Towers, Stills, Washers and Concentrators, capable of continuous or intermittent operation, and have the special merit of unit construction which permits of providing extra capacity for peak loads. With this system, the partial retention of illuminating properties in the gas is within the control of the operator. Complete equipment can be furnished.

THE WALTER E.

LUMMUS

173 Milk Str COMPANY Boston, Mass.

Tech. Div.
INDEXED

VOL. 12. NO. 9 CHICAGO NOVEMBER 14, 1917

The GAS RECORD

Member
Audit Bureau of Circulations

THE GAS MAN'S NEWSPAPER

SEMI-MONTHLY, $2.00 A YEAR

Member
Associated Business Papers

In the majority of propositions submitted to us we find that increased gas plant capacity can be obtained by remodeling existing apparatus
Before buying new equipment get a report from our
CONSULTING DEPARTMENT
It will save you both time and money

VHA

STEERE ENGINEERING COMPANY
DETROIT

Send for Your Copy of "Centrifugal Compressors in Gas Plants"

Our new bulletin will show you how to obtain pulsation free gas controlled by our constant suction governor which will hold a constant absolute pressure on gas ovens or retorts.

It will indicate why the superior efficiency of G-E Centrifugal Compressors is saving 30 to 40 per cent of power bills for water gas generators.

Write at once to our nearest office for copy of Bulletin No. 48600

General Electric Company

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio.
Cleveland, Ohio
Columbus, Ohio
*Dallas, Tex.
Dayton, Ohio
Denver, Colo.
†Detroit, Mich.
Des Moines, Iowa
Duluth, Minn.
Elmira, N. Y.
Erie, Pa.
*El Paso, Tex.
Fort Wayne, Ind.
Hartford, Conn.

General Office: Schenectady, N.Y.

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Joplin, Mo.
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Los Angeles, Cal.
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New Haven, Conn.
New Orleans, La.
New York, N. Y.
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Seattle, Wash.
Spokane, Wash.
Springfield, Mass.
Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.
Youngstown, Ohio

7488

*Southwest General Electric Company †General Electric Company of Michigan

For CANADIAN BUSINESS refer to Canadian General Electric Company, Ltd., Toronto, Ont.

GENERAL FOREIGN SALES OFFICES, Schenectady, N. Y.; 30 Church St., New York City; 83 Cannon St., London, E. C., England

L. 12. NO. 10 CHICAGO NOVEMBER 28, 1917

The GAS RECORD

Member Bureau of Circulations

THE GAS MAN'S NEWSPAPER

SEMI-MONTHLY, $2.00 A YEAR

Member Associated Business Papers

"NATIONAL" Preparedness

A gentleman once said to a representative of the National Tube Company—"What can you say about pipe; it's simply a bunch of air with a piece of steel around it." An immediate answer was not available, but shortly after this a book, "The Age of Power," written by an engineer, came to the attention of the person addressed—and the theme was this: There is less difference than is usually supposed between the 20th Century and, say, the 10th or 12th or any other previous Century. There is nothing new under the sun. There is a difference, however, in the externals, and this difference can be reduced to some phase of the Generation, Transmission and Use of Power and the Ramifications thereof.

Inasmuch as pipe is an essential part of power, this would seem to be an interesting idea.

An attempt was made to elaborate the theme in prose, without much success. The matter was then put into the hands of Berton Braley (the poet of industry) and the following poem is the result. The whole thought of the poem is contained in the next to the last line—"Framework of civilization is wrought of it." It should be noted that this poem has particular reference to daily living preparedness, and not in any way to military preparedness.

ARE we prepared? Yes, for every emergency,
Every contingency under the skies;
Ready for cases of danger and urgency,
Ready for commonplace needs that arise;
Fully prepared for our labor or pleasuring,
Armored and armed for the course to be fared,
Fit for each chance that the mind can be measuring—
"NATIONAL" Tubing has made us prepared.

"NATIONAL" Tubing prepares us for traveling;
Carries the steam that is driving the train,
Keeps us in ease as the miles are unraveling
Over the mountains and over the plain;
"NATIONAL" Tubing brings water of purity
Into our homes from the far-away hills;
Stands at our windows, a guard of security;
Brings us our gas—and the drudgery kills!

WHY, from the time we are infants in carriages
(Go-carts of "NATIONAL" Tube, as you know),
Up through our childhood, our loves and our marriages,
On till our tresses are covered with snow,
"NATIONAL" Tubing's assisting and aiding us;
Keeping us warm when the icy winds blare,
Holding up awnings in summer, for shading us,
—"NATIONAL" Tubing has helped us prepare.

CASING for oil wells, shafts for machinery,
Pipes for the drills digging copper and gold,
Poles for the power wires looping the scenery,
Frames for the plows that are turning the mold;
"NATIONAL" Tube, in a thousand varieties,
Serves for ten thousand requirements of life,
Whether in places where comfort and quiet is
Or in the midst of the heat and the strife.

SO when we speak of preparedness "NATIONAL,"
"NATIONAL" Tubing is there—it's a pipe!
Fully prepared for the needs that are rational,
Builded for service of many a type;
Dreamers have dreamed and the thinkers have thought of it,
Till every nation its service has shared;
Framework of civilization is wrought of it,
"NATIONAL" Tubing has made us prepared!

By BERTON BRALEY

NATIONAL

"NATIONAL" Pipe is made by
National Tube Company
Pittsburgh, Pa.

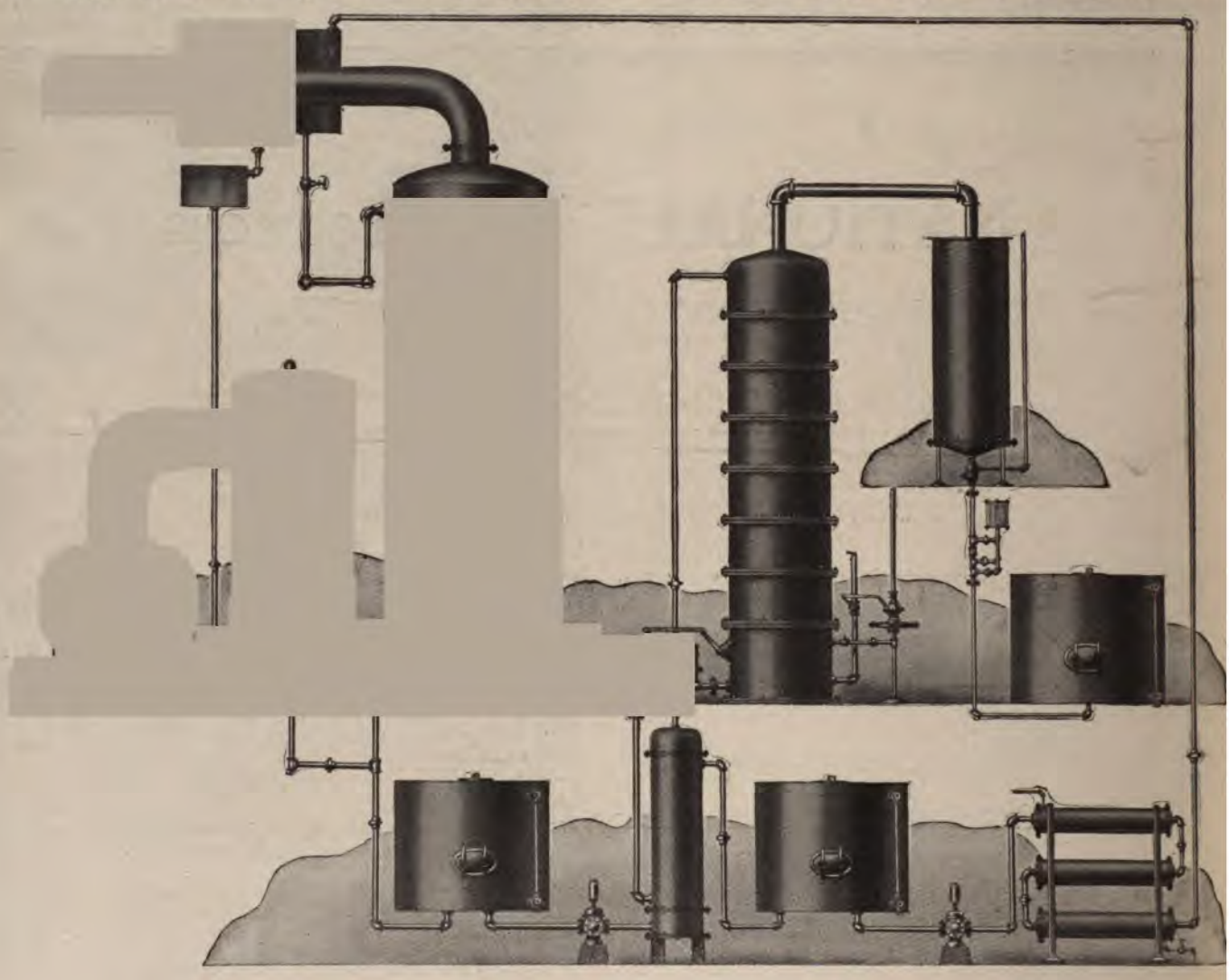
NATIONALly Prepared

Our Government Wants Your Toluol

THE LUMMUS ABSORPTION SYSTEM

INSURES

High Recovery from Gas and Purity Required for Explosive



Direct Recovery of Light Oils from Gas

The recovery of Benzol, Toluol, etc., directly from retort oven gases, without the intervention of condensing and re-distilling operations, greatly cheapens and simplifies their manufacture in quantities. The apparatus and processes employed are susceptible of adaptation to the largest scale of manufacture, are more flexible of control and hence better suited to selective recovery, and are cheaper to build and to operate than the cumbersome equipment and laborious processes which they have superseded.

The Lummus Continuous System, for direct recovery of Light Oils, is reduced to simple elements of pre-coolers, Absorbing Towers, Stills, Washers and Concentrators, capable of continuous or intermittent operation, and have the special merit of unit construction which permits of providing extra capacity for peak loads. With this system, the partial retention of illuminating properties in the gas is within the control of the operator. Complete equipment can be furnished.

THE WALTER E.

LUMMUS

173 Milk Street COMPANY Boston, Mass.

OL. 12. NO. 11 CHICAGO DECEMBER 12, 1917

The GAS REC

THE GAS MAN'S NEWSPAPER

Member
dit Bureau of Circulations

SEMI-MONTHLY, $2.00 A YEAR

Member
Associated Business Papers

Get our proposition
for *early delivery* on

Steel plant work
Steel pipe
Gate valves
All gas works apparatus

Steere Engineering Co.
Detroit, Michigan

Anderson & Gustafson

QUALITY
A&G
SERVICE

Tulsa, Okla.
Daniel Bldg.

St. Louis
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Wabash Bldg.

Cleveland
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Finance Bldg.

New York City
Woolworth Bldg.

Petroleum Products

Transportation Building

Chicago

. 12. NO. 12 CHICAGO DECEMBER 26, 1917

The GAS RECORD

THE GAS MAN'S NEWSPAPER

Member Bureau of Circulations

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SEMI-MONTHLY, $2.00 A YEAR

STEEL PIPE *and* PROGRESS

A TWENTIETH CENTURY EPITOME OF STEEL PIPE HISTORY

NATIONAL WORKS of National Tube Company, McKeesport, Pa. Greatly enlarged since this picture was made. Other plants: Christy Park Works, McKeesport, Pa.; Continental Works, Pittsburgh, Pa.; Galvanizing Works, Versailles, Pa.; Lorain Works, Lorain, Ohio; Pennsylvania Works, Pittsburgh, Pa.; Republic Works, Pittsburgh, Pa.; Riverside Works, Wheeling, W. Va.; Ellwood Works, Plant A; Ellwood Works, Plant B, Ellwood City, Pa.; Syracuse Works, Syracuse, N. Y. Number of employes, about 30,000. Largest makers of Pipe and Allied Products in the world. Manufacturing capacity in the neighborhood of one and one-half million tons of "NATIONAL" Tubular and Allied Products per annum. In addition to the plants named above, a new mill has been projected at Gary, Ind., which alone will have a capacity of about 500,000 tons of "NATIONAL" Tubular products per year.

Look For

NATIONAL

The Name

"NATIONAL" Bulletin No. 24—The Rise of Steel Pipe. A copy of this informative publication will be sent free to anyone whose letterhead or position would indicate a legitimate use.

It pays to be NATIONAL ly Prepared

NATIONAL TUBE COMPANY, GENERAL SALES OFFICES: FRICK BUILDING **PITTSBURGH, PA.**

District Sales Offices

Atlanta Boston Chicago Denver New Orleans New York Philadelphia Pittsburgh St. Louis St. Paul Salt Lake City

PACIFIC COAST REPRESENTATIVES:—U. S. Steel Products Company San Francisco Los Angeles Portland Seattle

EXPORT REPRESENTATIVES:—U. S. Steel Products Company, New York City

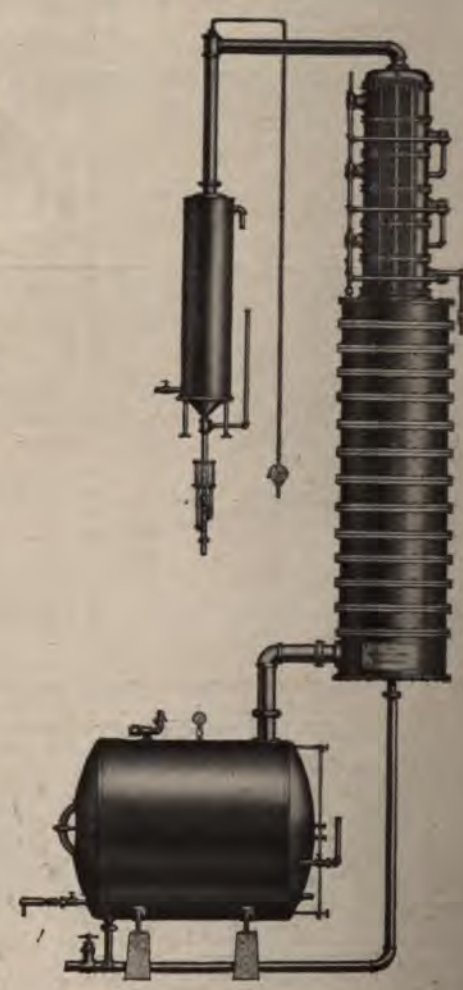
TOLUOL - - BENZOL

LUMMUS APPARATUS

Complete Plants

Including

Absorbing Towers, Stripping Stills, Crude Light Oil and Refining Stills, and Washers



Refining Equipment for Continuous or Intermittent Operation

High Recovery and Purity of Product

Twenty-four years' experience constructing and operating distillation plants and apparatus, and twelve years' experience building high grade chemical distilling, absorbing and refining equipment.

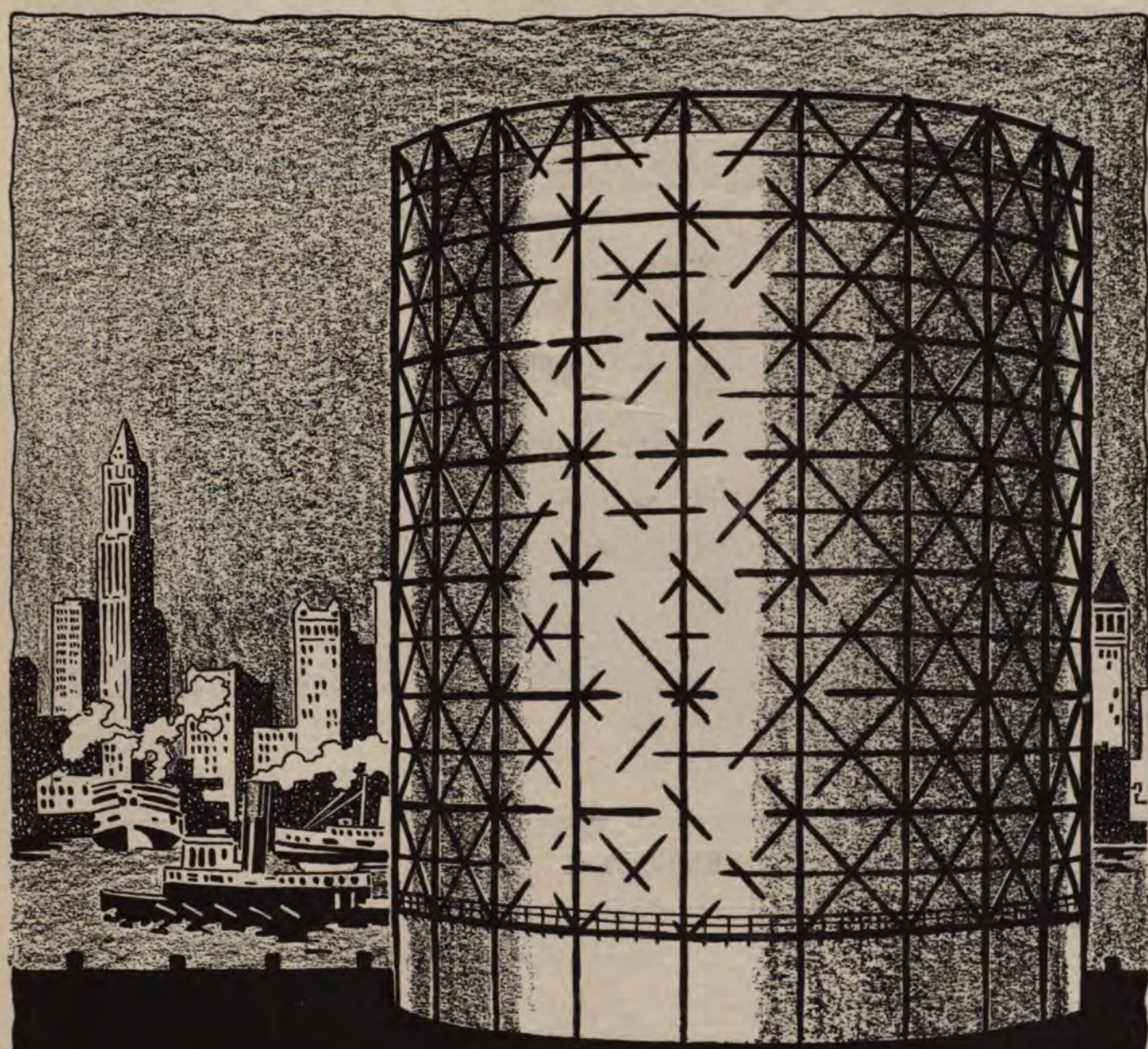
Our SMALL SIZE DEMONSTRATION OUTFITS are designed for test runs as required in the CHEMICAL CONTROL of the MAIN PROCESS.

The WALTER E.

LUMMUS

COMPANY

Office: 173 Milk St., Boston **Works: Everett, Mass.**

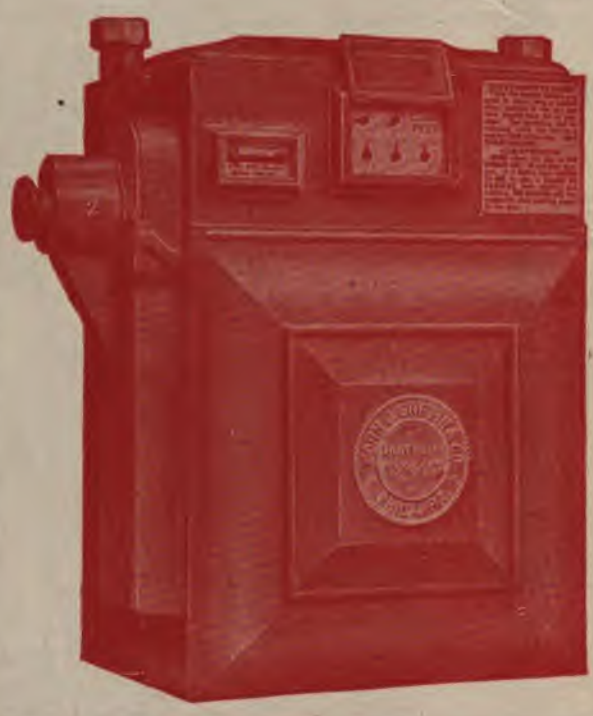


GAS HOLDER BUILDERS
SINCE 1851

TANKS, VALVES, BENCH CASTINGS,
PLATE & STRUCTURAL METAL WORK,
GAS PLANT EQUIPMENT.

THE STACEY MANUFACTURING CO.
CINCINNATI, O.

THE POSITIVE PREPAYMENT METER



Is there gas business in your territory you are not getting?

Prepayment meters bring an inflow of business which would not come through any other channel.

35% of the gas consumers of the United States buy gas through prepayment meters.

JOHN J. GRIFFIN & CO.
GAS METERS
1513-21 Race Street Philadelphia, Pa.

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THE PROGRESSIVE CITY

OF

IS TO HAVE A FOUR HUNDRED THOUSAND

VERTICAL RETORT PLANT

IT'S THE

U. G. I. SYSTEM

OF COURSE!!

Discuss the Needs of YOUR Plant with

The United Gas Improvement Company
Philadelphia

REZNOR

The Re

TIME was never more valuable than it is now, nor specialized production more essential to the general welfare. Therefore, when the REZNOR MANUFACTURING COMPANY announces its resolution to devote its entire share of 1918, and all its great special factory facilities to the closest possible co-operation with American gas companies, it feels reasonably sure its resolution will be received as something worth while.

REZNOR co-operation such as this resolution contemplates aims to inform American gas consumers of the advantages of heating homes with gas instead of with expensive, extravagant, and, in many localities, unobtainable coal and oil. It aims to supply these consumers, through the medium of gas companies, with the safest, the most economical, convenient and efficient of all gas heating appliances. It aims therefore, to provide American gas companies with a very definite and a very valuable service, plus appliances from which will accrue not only a satisfactory legitimate profit in dollars and cents but also that still more valuable asset, the satisfied customer.

REZNOR reputation and REZNOR facilities guarantee that the pledges involved in this resolution will be carefully and conscientiously performed.

REZNOR executives and operatives already are in action perfecting the plans necessary to carry out the terms of the resolution.

Materials for the standard REZNOR products in portable, fireplace and wall gas heaters, and also for several new REZNOR products, are being se-

Reznor Manufact

nor Resolution

lected and assembled by the most capable and experienced experts in the business.

Specially trained representatives who are thoroughly familiar with all details of REZNOR local sales campaigns will carry REZNOR co-operation in person from the factory to the gas company and its customers.

The best advertising and artist talent obtainable has been added to the publicity department in order that the REZNOR messages to the consumer may be attractive as well as informing. Plans for local newspaper and direct mail educational campaigns are under way.

In addition to all this constructive service, there is the highly important asset of REZNOR national advertising which has added its powerful influence to REZNOR products. It has established the name of REZNOR as a desirable acquisition to the American family and it will continue to create a universal demand for REZNOR comfort and convenience wherever it is possible to install it.

Everything possible to expedite the prompt and efficient performance of the REZNOR resolution has been done.

REZNOR has resolved on close gas company co-operation this year.

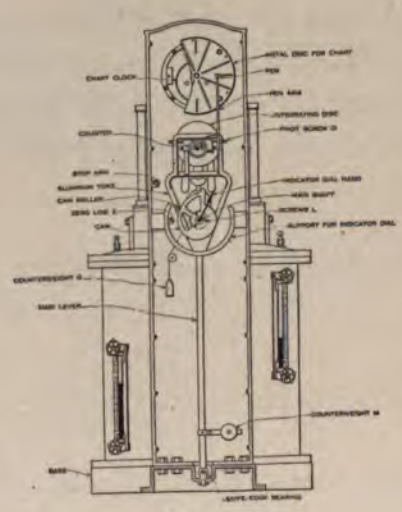
REZNOR time, energy and experience now await your order. Ask for them.

ing Co., Mercer, Pa.

REZNOR

Testing and Adjusting

(Figure 1)



(Figure 2)

The Venturi Gas Meter

is quickly and accurately tested and adjusted without interrupting the flow of gas through the pipe line. In fact the Type Q S Register-Indicator Recorder is under continuous test as to mechanical adjustment. If the readings of the three dials agree with the reading of oil level scales on the oil wells, the observer knows the device is adjusted correctly. Should there be any discrepancy the necessary adjustment is made by removing the front case (see Fig. 2) and setting the mechanism according to explicit printed directions furnished with the machine.

There is no tendency for the machine to get out of adjustment after being correctly set. However the ease with which the adjustment may be made gives the user a check on the results which is convincing.

If you are not already familiar with the old reliable Venturi principle as applied to gas measurement, it will pay you to send for our complete Bulletin No. 86.

Builders Iron Foundry, Providence, R. I.

"BUILDERS OF THE VENTURI"

BRANCH OFFICES—25 Church St., New York City; Oliver Building, Pittsburgh, Pa.; The Rookery, Chicago, Ill.; N. B. Livermore & Co., Merchants National Bank Building, San Francisco, Cal.; Northwestern Equipment Co., Northwestern Bank Building, Portland, Ore.; Allen General Supplies, Ltd., Toronto, Ont., Canada.

Anderson & Gustafson

QUALITY
A&G
SERVICE

Tulsa, Okla.
Daniel Bldg.

St. Louis
Rwy. Exch. Bldg.

Pittsburgh
Frick Annex Bldg.

Cleveland
Citizens Bldg.

Kansas City
Finance Bldg.

New York City
Woolworth Bldg.

Petroleum Products

Transportation Building

Chicago

Radio-Series

They Will Be Ready--

IN every factory in your city when they look the annual statement over, they will be ready for the gas man. Costs will show sky high compared with other years. They will be ready to talk practical economies.

Go to these men, then, and explain the Humphrey Radio-Series Lighting Units, how this is the *modern* gas light—better light than they have now—also more economical. Show them these units in comparison with their electrical equipment. Open their eyes to what gas light *is* now-a-days.

Your best profit opportunity this year will be the development of commercial lighting along existing mains. Every store and every factory will pay you richly if you will campaign this field at this most favorable time.

Sell the Radio-Series—All of Them

General Gas Light Company

New York Kalamazoo San Francisco

Radio-Series

A Busy World is Short of Labor

Storekeepers, manufacturers, business men everywhere are up against a shortage of labor. Grasping every idea for better, faster work they are not overlooking LIGHT—the Dad of all efficiency—eye-resting gas light.

Safety with speed requires an even spread of illumination everywhere and gas with the

"REFLEX-20"

makes this possible because of the low cost of installing, the low cost of maintenance and gas, and the high power of the unit.

Hence the Harvest for the Gas Company with the "Reflex-20."

Materials enough on hand to make up some more lamps, but to be sure of present prices you should get your orders in today.

Welsbach Company

FACTORIES

Gloucester, New Jersey

The "C-C" Lighter—"the pilot that won't blow out" is making a hit on "Reflex-20" installations

THE empty coal bin is no menace to the home that is equipped with

The Humphrey Radiantfire

In every room in the home a Radiantfire in the fireplace will provide heat, comfort, health and for less cost in coin and trouble. For rooms without a fireplace, use the Portable Radiantfire --"an open fire for any room."

Guard your own homes, protect your customers in this emergency. Have Radiantfires ready when their coal gives out.

General Gas Light Co.

New York Kalamazoo San Francisco

The Humphrey Radiantfire

New Orleans Gas Company Copes with Coal Shortage

ANOTHER VICTORY FOR GAS—AND "GARLANDS"

The Hotel Grunewald, New Orleans, Installs "Garland" All-Gas Kitchen

The New "Garland" All-Gas Kitchen

The Old Coal Installation

THE SHORTAGE OF COAL MAKES THIS THE APPOINTED TIME FOR GAS COMPANIES TO DEVELOP NEW HOTEL AND INDUSTRIAL BUSINESS.

New hotel and industrial business seldom entails main extensions. Also, there are many other obvious advantages. And—

The Satisfactory Service enjoyed by all users of "Garland" Hotel Gas Ranges and Appliances is a mighty argument in securing new hotel and industrial business. There are thousands of such users. And the argument is an overwhelming one—it ranges from the Waldorf-Astoria to little-hole-in-the-wall lunch rooms, stretching from the Atlantic to the Pacific.

Attention—New Business Managers

Pictures of notable "Garland" Installations and some eye-opening news about "Garland" All-Gas Kitchens have been prepared for your assistance and will be sent upon request.

GARLAND STOVES AND RANGES The World's Best

The Michigan Stove Company

Largest Makers of Heating and Cooking Appliances in the World

DETROIT, MICHIGAN

GARLAND STOVES AND RANGES The World's Best

Radio-Series

They Will Be Ready--

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New York Kalamazoo San Francisco

Radio-Series

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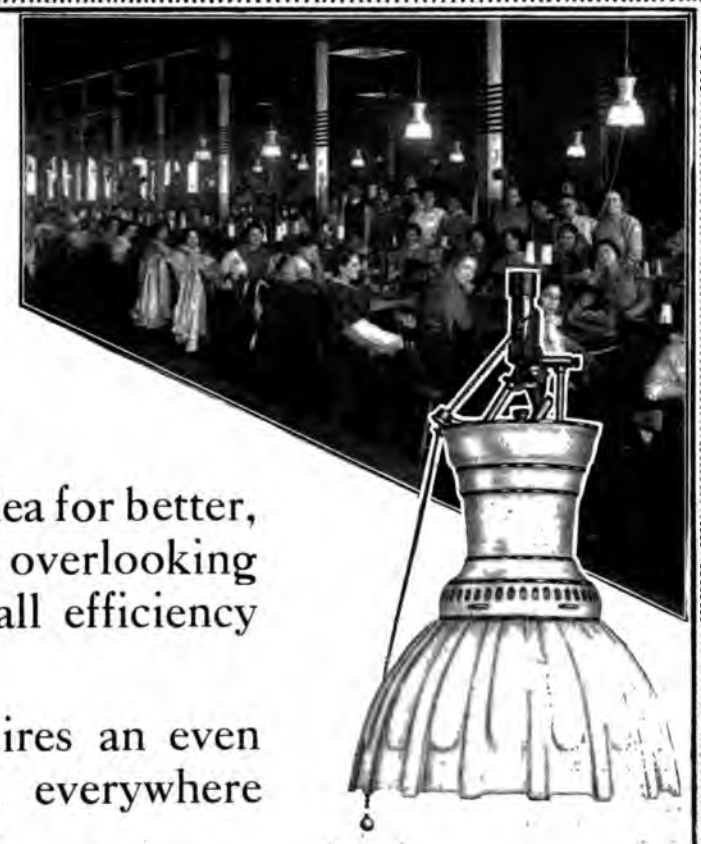

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Welsbach Company

FACTORIES

Gloucester, New Jersey

The "C-C" Lighter—"the pilot that won't blow out" is making a hit on "Reflex-20" installations

Odorless Gas Iron

Nu Styl, Two-(Weights) In-One Iron

Bunsen Burner, Hale Gas Mixer Shock Absorber, Spring Handle

The women folks say: "I iron all day in small room without trace of gas smell." "I would not be without my Nu Styl, for ten dollars." "I have tried all the gas irons but did not know what a real iron was until I got my Nu Styl."

We will send sample iron for testing to interested new business men.

Shipping weight, one dozen Nu Styl Ironing Outfits, 115 lbs. See descriptive ad Gas Record of Nov. 28, 1917, page 44.

Perfect Combustion Co.
528 Peoples Gas Bldg., Chicago, Ill.

GWYNN GAS BURNERS

are constructed to produce a rotary or swirling mixing process and numerous tests have proven this principle of rotary mixing process is recognized as fundamentally correct.

Our Catalog No. 40 explains the whole thing in detail.

Write for copy.

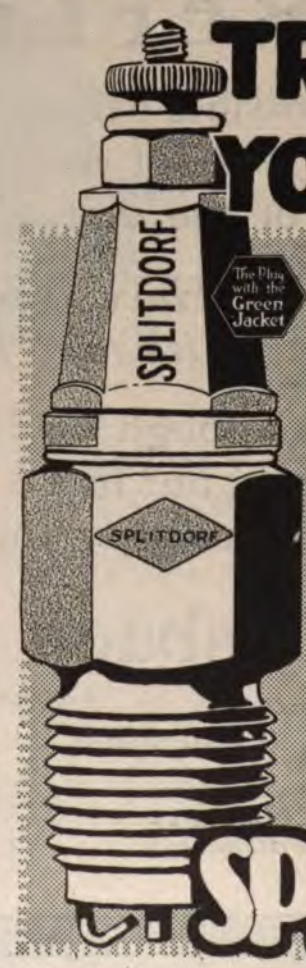
The Gwynn Engineering Company
Empire Bldg. Pittsburgh, Pa.

The Reverso Gas Table Toaster

One electric company has sold more than 1170 electric toasters this year.
This business the gas companies could command with the Reverso Gas Toaster.
It is the only toaster that turns out deliciously browned toast, without danger of burning fingers, crumbs or table linen.
The toast is turned by a small lever.
A coffee pot may be heated and kept warm on top of the Reverso Toaster.
This is a dandy appliance and a whirlwind for getting domestic gas business.
Send for the story.

Electro Weld Co., 295 Lincoln Street Marlboro, Mass.

TRY ONE in YOUR Ford



Select No. 1 cylinder in any Ford as the one that bears the brunt of possible fouling—
The one that is up against the annoying and costly flooding with oil—
Put a SPLITDORF Plug in it as a TEST—
You'll want SPLITDORF Plugs in the other cylinders, too, when you see the difference in the firing and when you realize how the imported India ruby mica core overcomes all trouble through cracked porcelains.

$1 each, wherever motor accessories are sold
Splitdorf Electrical Co.
Newark, N. J.

SPLITDORF SPARK PLUGS

Grocery Store

WHERE TO SELL HAWKS VENTILATING GAS RADIATORS

No. 3

Banana Ripening Room

For Banana ripening rooms in commission houses, a flexible, compact and wearproof system of Hawks Radiators. Best for drying rooms in candy or statuary factories because condensation is carried off and circulation maintained. Economical in grocery or butcher shops where a low temperature is desired or extra heat needed in the cashiers' office. Just fit in "movie" ticket offices.

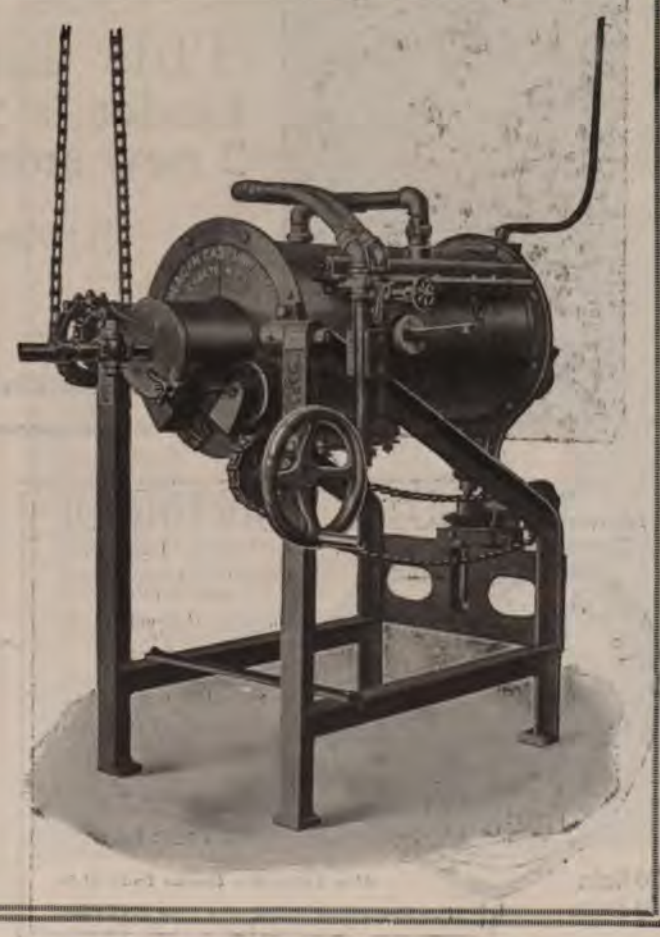
Absolutely simple. No steam or water used. Ventilation actual. Made in cast or Prest Armco Iron types. Neat, reliable, always ready. Get one and try it.

The HAWKS LINE of INDUSTRIAL APPLIANCES

HUGO MFG. CO.

DULUTH - - - MINN.

CASE HARDENING



Case hardening is an operation that tests the merits of gas and the gas appliance to the utmost.

As we are responsible for the majority of the installations for case hardening by gas, now in successful operation, we can give you very valuable help in securing this profitable business.

AMERICAN GAS FURNACE CO.

24 John Street - NEW YORK

HIGH PRESSURE

COMBINATION STYLE
(WITH MERCURY SEAL

REYNOLDS

ARTIFICIAL GAS GOVERNORS
AND
NATURAL GAS REGULATORS

For All Kinds of Pressure Reduction
WRITE FOR CATALOG

SERVICE GOVERNORS

"OLD STYLE"
WITHOUT SEAL

Pacific Coast Representative
C. B. BABCOCK CO.
768 MISSION STREET
SAN FRANCISCO

REYNOLDS GAS REGULATOR CO. — MAIN OFFICE AND WORKS ANDERSON, INDIANA

GRAVER TANK WORKS
East Chicago, Ind.

Steel Plate GAS APPARATUS
To Specifications

This handy GAS RECORD
binder is yours for $1.50 or free with 2 new subscriptions at $2 a year each.

It holds 12 issues of THE GAS RECORD
convenient for reference.

THE GAS RECORD
20 West Jackson Blvd. Chicago

The House of Taylor

HOTEL MARTINIQUE
BROADWAY, 32D STREET NEW YORK

One Block from Pennsylvania Station.

Equally Convenient for Amusements, Shopping or Business.

157 Pleasant Rooms, with Private Bath,
$2.50 PER DAY.

257 Excellent Rooms, with Private Bath, facing street, southern exposure,
$3.00 PER DAY.

Also Attractive Rooms from $1.50

The Restaurant Prices Are Most Moderate.

400 Baths
600 Rooms

For Cast Iron and Sheet Metal
UNIVIT
· PORCELAIN ·
ENAMEL

The Success of 50 Years' Experience

OUR large capacity insures quick service—UNIVIT assures uniform color, thickness and durability.

Write us now about your Enameling needs

Cribben & Sexton Company
CHICAGO, ILL.

Westinghouse

Improved Gas Meters

Have solved the gas man's greatest trouble

Disposal of Condensation

For measuring casing-head gas, or any gas impregnated with gasoline or other condensate, whether under pressure or vacuum,

An Automatic Overflow
Drains Off All Condensation

Westinghouse Improved Gas Meters are all metal construction—no leather used in any part. Leather diaphragms stretch and break when used under high pressure and, when used under vacuum or ordinary pressure, become worthless after a few days' subjection to condensate, making registration inaccurate, or stopping the meter.

Westinghouse Improved Gas Meters pick up the slightest minimum load as accurately as they carry the maximum. The bearings are self-lubricating, eliminating undue wear.

Pittsburgh Meter Company

General Office and Works, East Pittsburgh, Pa.

New York, 149 Broadway. **Seattle,** 802 Madison St. **Kansas City,** 6 W. 10th St.
Chicago, 5 S. Wabash Ave. **Columbia, S. C.,** 1433 Main St.
Los Angeles, 631 South Spring St.

Also Manufacturers of Keystone and Eureka Water Meters: Proportional Gas. Meters for any Pressure, and Meter Provers

Made to Meet the Gas Man's Need

GOODMAN STOPPER
The Half Minute
GAS MAIN SHUT-OFF

Sold on trial. Guaranteed unconditionally. Information gladly furnished on request.

Safety Gas Main Stopper Company

257-263 East 133rd St., New York, N. Y.

"Can I Make Gasoline from Natural Gas?"

H. A. FISHER COMPANY

Natural-Gas Gasoline Engineers

can tell you definitely. Their new system of testing the gas at the wells is the best plan yet devised. It is absolutely dependable. It eliminates the "guess-work" from the gasoline business.

542 Winfield Street PITTSBURGH, PA.

JOHN S. UNGER MECHANICAL AND CHEMICAL ENGINEER

Builder of Unger Ammonia Stills. Complete Plants for Aqua, Anhydrous and Sulphate

3344 Broadway CHICAGO

A Happy New Year with the RUTZ

The RUTZ Gas Range Lighter is easily the most successful gas range improvement of recent years. It has been adopted by hundreds of gas companies and readily purchased by thousands of their consumers for its safety, convenience and economy.

The RUTZ success with gas companies is substantially founded. The price always has been reasonable and when refinements in the device were possible, RUTZ quickly adopted them.

Specify RUTZ on all gas ranges.

Milwaukee Gas Specialty Company
2015 Clybourn St. Milwaukee, Wis.

Protected by Patents

The "consumer-demand" for the "IWANTU" COMFORT GAS IRON is increasing rapidly because for economy's sake, less wash is now going to the laundry, more is being done at home

It will pay you to get ***your*** share of this increased business, not alone for the immediate profits, but because more than ever, the use of "IWANTU" Irons, demonstrates the advantages of gas. Send in today orders for your 1918 supply.

STRAUSE GAS IRON CO., PHILADELPHIA

Three Arm 32-Tip Gas Burner Equipment For Coal-Fired Electrotype Backing Furnace

Electrotypers like gas on their backing furnaces. It gives them fast, clean melts and uniform temperatures.

The equipment shown above fits the standard coal fired backing furnace and has won almost every electrotyper in Chicago to gas fuel.

Let us quote you prices.

"An Industrial Service"

THE NATIONAL MACHINE WORKS
1559 Sheffield Ave. CHICAGO

Tepco
PORCELAIN ENAMELED STOVE PARTS
...QUALITY FIRST...
The Enamel Products Company.
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PRICE, $8.00 EXPRESS PAID

"Something MORE than just a Spot-light." Every car-owner needs one of these combined "trouble-light" and "Spot-lights." Just loosen a knurled nut and carry the lamp to any part of the car for inspection. Automatic—no electrical connections to make. Cord works just like a curtain roller.

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THE IMPROVED EQUIPMENT CO.

Combustion Engineers

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In touch with every gas lighting development for 65 years

That is why we know just what's what in the gas lighting business today and can furnish you practically anything you need in the nature of gas lighting supplies.

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is approved by the leading safety authorities. It is widely used for Exit Lights. Make it your standard for this use.

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CLASSIFIED ADVERTISING

Rates: 5 cents a word.

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WATER GAS MAKER

by a Gas Company in South Jersey. Sending out one-half million cubic feet per day. Good salary and steady employment to the right man.

Address only **GAS COMPANY. Millville, N. J.**

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WANTED—Gas Arc Salesmen willing to work in the vicinity of New York City. Write, giving full details of experience and references, to Cameron Brown, Campaign Manager, GENERAL GAS LIGHT CO., 44 W. BROADWAY, NEW YORK. Apply by letter only.

WANTED — Plant Superintendent for small plant, two benches of sixes. Must be capable of handling negro labor in South. Good salary to the right man. Address 937, care GAS RECORD, 20 W. Jackson Blvd., Chicago.

WANTED—An experienced water gas maker or helper. BELOIT WATER, GAS & ELECTRIC CO., BELOIT, WIS.

WANTED.

We have a position open for a man to take charge of a newly constructed coal gas plant of 75 million per month output. This position carries a good salary and would prove desirable to an experienced superintendent. One who has had a technical education will be preferred. Address 940, care GAS RECORD, 20 W. Jackson Blvd., Chicago.

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WANTED—Copies of the following issues of THE GAS RECORD for March 25, Oct. 14, Dec. 23, 1914; March 24, 1915; March 22, May 10, Aug. 23, 1916; May 23, Aug. 8, Sept. 26, Oct. 10 and Oct. 24, 1917. We will credit your subscription one month for each copy that is sent in. GAS RECORD, 20 W. Jackson Blvd., Chicago.

FOR SALE.

FOR SALE—50,000 cu. ft. single lift steel tank Gas Holder; erected 1912 in Illinois City. Purchaser must dismantle. Reference or financial rating required. P. O. Box 212, Merion Station, Pennsylvania.

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We have for sale seven separate gas plants in Eastern and Southern States, located in growing cities of over 10,000 population, which can now be purchased at one-half their value on terms requiring very little cash. The present earnings are sufficient to take care of operation and nearly all interest charges, and earnings can easily be increased 50 per cent, by active management. Each company is a separate proposition. Write for details. A. M. Worstall & Co., Real Estate Trust Bldg., Philadelphia, Pa.

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Are You Looking for Used Apparatus or Have You Any for Sale?

Write Us.

There is no charge for locating equipment for you.

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Get Our QUOTATIONS on GAS OIL and other PETROLEUM PRODUCTS

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UNION PETROLEUM COMPANY
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SITUATION WANTED.

"The success of an institution is the sum of the successes of the individuals comprising that institution."

The services of a commercial manager with a vast experience in all departments and capable of superintending shop are available.

The services of a commercial manager if survey of conditions convinced him that his ability and experience qualified him.

Has logical reason for desiring a new position.

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APPARATUS WANTED—We buy condemned and old gas meters; all kinds. P. O. Box No. 1331, Pittsburgh, Pa.

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This Is a War of Industries. Our Factories, pitted against the skill of Teuton ingenuity, must develop maximum production, with minimum fuel, and still maintain quality.

—Every Furnace

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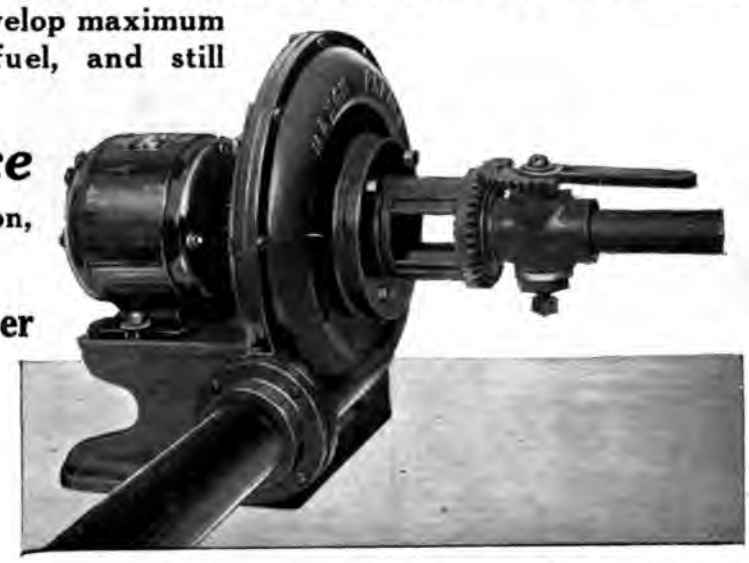
Maxon PREMIX Burner

is the range finder which assures accuracy in efficient fuel application.



Maxon Premix Burner Co. Muncie, Ind.

Gas makes Ice

Gas has a big, new field opened for it by the

Zander Automatic Gas Refrigeration Machine

Prepare a place in your new business plans for this tested appliance; 11.5c worth of gas makes 100 lbs. of ice (gas at 80c a thousand). The Zander Machine is simple, noiseless, compact and safe. The inventor knows how to make a gas appliance that is certain of mighty low maintenance.

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ZANDER REFRIGERATION COMPANY

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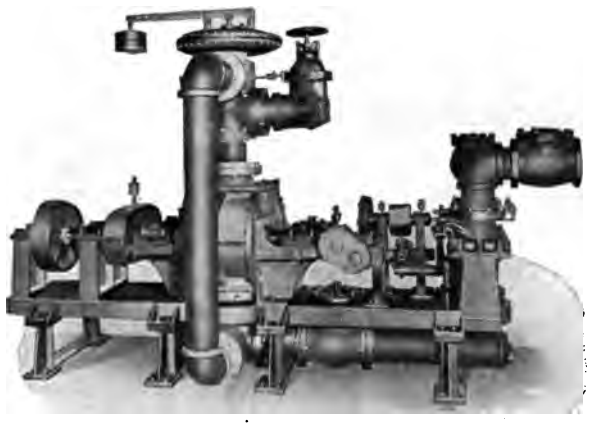
The Kemp Automatic Gas System



The Kemp Automatic Gas System

RESULTS have proven the Kemp System a highly profitable investment for the gas user, both with respect to fuel economy and efficient application, also a friend of the gas company.

Mr. Gas Manager:—

When your consumer uses the Kemp System he is satisfied his gas service is all that could be desired, he knows he has the best and lowest priced gaseous fuel obtainable. You have done him a valuable service in applying your gas through our apparatus, and need feel no apprehension lest some aggressive salesman replace your service with a gas generating plant. Let us work with you.

Results Guaranteed

THE C. M. KEMP MFG. CO.
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CUTTING OUTFITS

"No Gas Department can possibly be complete without a welding outfit from this time on."

The great value of the oxy-acetylene outfit for welding and cutting to the Gas Industry is not confined to welding new gas main. It is even more valuable in emergency work, for repair work, both in the field and in the shops—saving time, saving cost, saving material that would otherwise be scrapped, and increasing efficiency.

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LEADS THE WORLD FOR RANGE, EFFICIENCY, AND NUMBER OF OUTFITS IN SUCCESSFUL USE.

The first welded pressure gas mains were welded with Davis Apparatus, and "D-B" outfits are in daily use by those concerns who have made the greatest success of oxy-acetylene welding, both in the Gas Industry and in all metal working lines.

The highest award at the Panama-Pacific Exposition for oxy-acetylene apparatus was given Davis Apparatus—the Medal of Honor, higher award than the Gold Medal—in the Collective Gas Exhibit.

Write for special pipe-welding data and other information of interest to gas engineers and superintendents.

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A combination that spells efficiency with a big E. Adaptable for installation wherever industrial thermometers are used. Mercury actuated, therefore sensitive, accurate and reliable. Ruggedly constructed, insuring maximum durability.

"Reform" Dial Thermometer

can be furnished with rigid stem extending to bottom or back or with flexible connecting tubing permitting the indicator to be mounted a distance away from point of application. Regularly furnished with six-inch dial, but can also be had with eight or twelve inch dials.

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For any temperature range up to 1000° F.

HIGHLY ENDORSED FEATURES

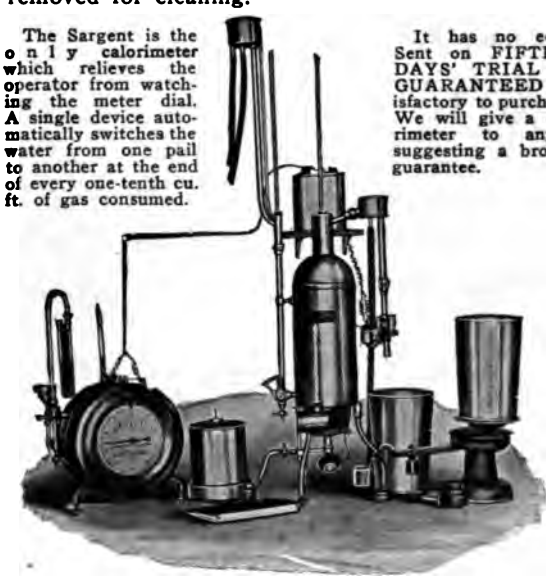
recommended by the American Gas Institute and the United States Bureau of Standards are all incorporated in the new

SARGENT
Automatic Gas Calorimeter

The inner tubes of the calorimeter proper are easily removed for cleaning.

The Sargent is the only calorimeter which relieves the operator from watching the meter dial. A single device automatically switches the water from one pail to another at the end of every one-tenth cu. ft. of gas consumed.

It has no equal. Sent on FIFTEEN DAYS' TRIAL and GUARANTEED satisfactory to purchaser. We will give a calorimeter to anyone suggesting a broader guarantee.



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Beaumont Double Skip Hoist: Boston Consolidated Gas Co. Full automatic operation: unloads car without attention after starting.

Fill the Bunkers by a Beaumont Skip Hoist

It handles either anthracite or coke without serious wear.

It takes very little power, and none when not working.

It is mechanically simple.

The motor and switches are protected from dust.

Replacements, when needed, are easy to make.

One man fills the skip bucket from a dump or hopper bottom car. Pressing a button causes the bucket to ascend, discharge, and return automatically while he goes for another load.

Beaumont Skip Hoists are preferred also for ashes handling in large power plants on account of their simplicity, low operating cost and non-liability to damage by heat or corrosion.

Our Skip Hoist Booklet, No. 32, tells all about them.

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Specialists in Coal, Ashes and Coke Handling Equipment for Gas and Boiler Houses.

The 60-Lt. B IRONCASE METER

THE DESIGN is the same as other sizes (5-B, 10-B, 20-B); all being an exact reproduction of the slide valve, two diaphragm tin meter transposed to an indestructible Ironcase. Made for any pressure up to 200 pounds.

METRIC METAL WORKS

OF AMERICAN METER COMPANY

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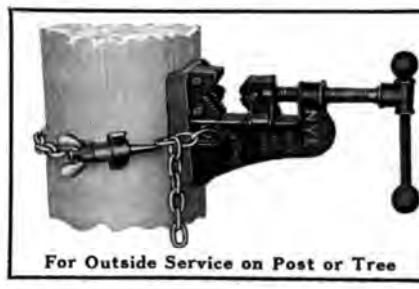
NYE COMBINATION CHAIN VISE

A time-saving, dependable Tool for outside service.

Easily and instantly attached to Post or Tree, with firm grip without tools, nails or screws.

Made the Nye way—The Best
Sold the Nye way—Free Trial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May be used as a bench vise.

Hook and chain of best forged steel, 38 inches long.

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Coal Gas Plants
Water Gas Plants
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From 15 Lbs. to 6 Oz.

For controlling pressure within the above limits use

THE FULTON DEAD WEIGHT GOVERNOR

It may be used as a district governor or for individual service.

The delivery pressure is balanced and controlled by a series of weights enclosed within the cap on diaphragm case.

The governor is practically frictionless and is very sensitive. It maintains a uniform pressure at any rate of flow.

Full details on request from

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Your Gas Holder will be effectively coated if

U S G Co's Mexican Graphite Paint

is used. Covers more surface and lasts longer than any Paint on the market. It is impervious to any known exposure of Gas Tanks.

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Do you need a more efficient purifying medium?

Have you outgrown your purifying capacity?

Are you compelled to use coal with a higher sulphur content?

Then Consult Us

We make any weight oxide desired.

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Our Materials Now Used In 291 Gas Works

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GAS CONSTRUCTION CO.

Contractors and Builders

"TENNEY PROCESS"
GAS WORKS

We build complete gas works, including buildings and mains. Correspondence solicited.

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Livest reading matter;
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Greatest circulation:
Three GAS RECORD features that make it the most productive advertising medium in its field. Write for rates.

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60 Ft. of Gas Per H.P. Per Hour

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Otis Automatic Skip Hoist

For handling Coal, Ashes and similar material

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AWARDED THE GRAND PRIZE AT THE PANAMA-PACIFIC EXPOSITION

Unique simplicity of construction. Over seventy five thousand sold. Write for Catalog A-1001

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High Grade Gas Brass Goods and Tools
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THE COST OF PIPE LAYING

Is lowest when the removal of pavement, drilling of rock ledges and boulders, the calking of lead wool joints and the tamping of the fill are accomplished with pneumatic equipment.

Less labor is required, less time consumed and the work is better done. Then too, the high pressure air affords a convenient means for testing the pipe line.

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Type **"550"** Sizes ¾ to 2 in.

Increase or Decrease Pressure on Trunk or Service Lines Without Replacing Governors

that's a big feature of the new CONNELLY SERVICE GOVERNORS. Controlling inlet pressure from 5" to 50 lbs.

It's only necessary to change the bushings or the fulcrum arm leverage to suit the changed conditions. Stamped steel construction.

It weighs 1-3 as much as cast iron governors. Very easy to repair in service. Many other details worth knowing. Write

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Dixon's Graphite Pipe Joint Compound

costs no more than ordinary joint "cements."

It makes tight joints, yet permits them to be separated at any time without trouble. No broken fittings to be replaced. There is every reason why you should use it.

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ESTABLISHED 1827 D-28

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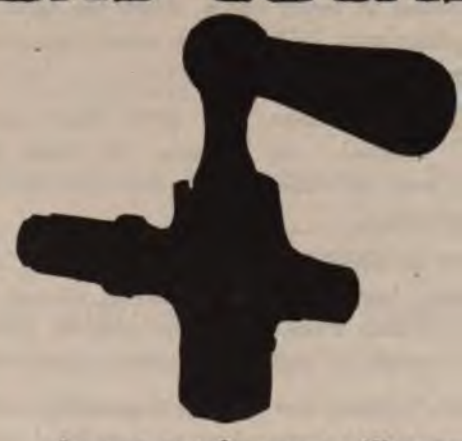

In our catalog you will see every kind of a trustworthy gas appliance cock.

McRAE AND ROBERTS Co.

DETROIT.

There are manufacturers on your mains wondering where they can get a furnace like this

STEWART
No. 28 Oven

The Stewart No. 28 needs only to be presented in many cases, when the boss of the plant says, "That's just what I want for die and tool hardening."

This oven takes very little floor space (24″ square). Its opening (4″ high, 8″ wide and 12″ deep) is at the right height for working.

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Don't forget our engineering-selling service is at your command on all industrial jobs.

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Industrial Gas Appliance Engineers and Makers
12th St. and Central Ave., Chicago, Ill.

Every kind of good brass cocks for gas appliances

Have you our catalog?

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So you can get acquainted with the Sprague Cast Iron Meter, we will ship on consignment, for trial.

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BRIDGEPORT, CONN.
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COLUMBUS, OHIO

Manufacturers of **Adjustable Meter Connections** *with* **Shelves**

Samples furnished upon request.

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Malleable Swivels
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Gauges, Thermometers, Temperature Controllers, Pyrometers, Tachometers

"The Gas Companies Standard"

Sensitive—Durable—Dead-Beat

Send for Bulletin No. AU-96.

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Foxboro, Mass., U. S. A.

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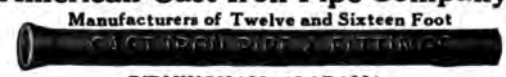
American Cast Iron Pipe Company

Manufacturers of Twelve and Sixteen Foot



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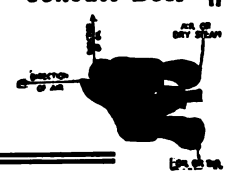
"Best" oil and tar burners will not carbonize

—when using ANY GRAVITY of liquid fuel, in combination with coal or breeze, or without this fuel.

The apparatus is simple to install—simple to operate.

For anything about burners, consult Best



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Meters and Regulators

For Natural and Artificial Gas

Sizes 3-4 in. to 24 inches

Catalog on Application

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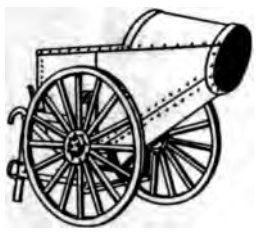
AKRON CHARGING BARROWS

(McNeill Patent)



They run easily and steadily. They are quickly filled and dump automatically without wasting a pound. These barrows have been tested with a load of 3,700 lbs. One man handled this work with comparative ease.

Send for illustrated catalog showing how AKRON BARROWS are valuable around gas works.

The Akron Cultivator Company

Charging Barrows, Coke Larries, Coke Barrows, Coal Wagons, Etc.

Akron, Ohio

Russell Engineering Company

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Coal Gas Benches

Complete Coal Carbonization Plants

SELL THAT IDLE EQUIPMENT.

If you've outgrown equipment that could be used by smaller companies, present market conditions and deliveries are such that you can move it quickly at a good price through a GAS RECORD Classified Advertisement. The rate is only 5 cents a word.

GENUINE VITREOUS PORCELAIN ENAMELED

Broiler Pans
Dirt Trays
Panels
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THE VITREOUS ENAMELING CO.

Grant Avenue at 71st Street, S. E.

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Asbestos Protected Metal r Roofing and Siding

For gas company buildings of all classes.
Economical—Low maintenance.
Permanent without paint under the most severe conditions of service. Ask for Bulletin

Asbestos Protected Metal Co. First National Bank Building **Pittsburgh.**

67

"Standard" Furnaces

at the Ford Motor Company

Ford selects all the equipment for his vast factories on the basis of quantity of production, quality of results and economy of operation.

67 Standard furnaces;—8 large oven type, 18 rotary flame type high speed steel furnaces, 13 small oven carbon steel furnaces, 4 cutting tool furnaces, 6 lead hardening, 3 broach hardening and 15 oil tempering furnaces are in use at the Ford.

Your industrial prospects are interested in selecting furnaces on the same basis Ford does; Standard furnaces will help you give them the kind of service they want.

Send for our marked catalogue showing the types of furnaces which are producing results at the Ford; show it to your prospects.

Standards Used Here, Too—

Dodge Bros.
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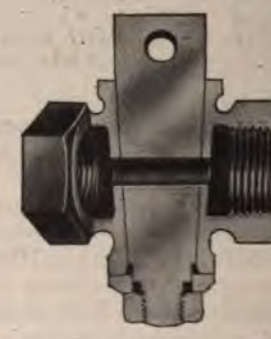
LUDLOW VALVES

Extra strong in every detail. Subjected to thorough tests before shipment to natural and manufactured gas companies. *Refer to the Ludlow catalog.*

Ludlow Valve Mfg. Co.
TROY, NEW YORK
Pittsburgh Kansas City Chicago
Boston Philadelphia New York

The Standard of
Efficiency
Workmanship and
Durability



For High or Low Pressure

Write for booklet of complete line

Kitson Company
2815-27 Oxford Street
Philadelphia - - Penna.

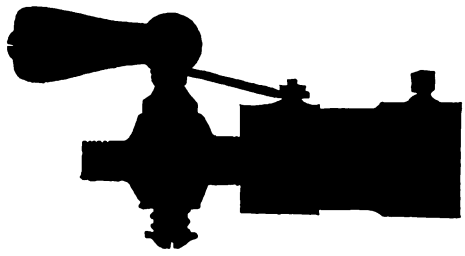
Is Your Plant Capacity Taxed?

Minor changes often can be made in present equipment to meet the increased demand for gas.
For many years we have specialized as designers and builders of coal carbonization plants. This experience is at your service.

Parker-Russell Mining & Mfg. Co.

Laclede Gas Building **St. Louis**

Will the Labor Shortage Interfere With Your Maintenance Service?



The chances are it will—seriously. The way to cut down the calls for maintenance is to install the Hale Gas Mixer at every opportunity. 90 per cent of a gas company's complaints may be traced to imperfect combustion.

The Hale Mixer simultaneously controls the gas and air flow necessary to complete combustion. It can't go wrong.

It is adaptable to both domestic and industrial appliances.

Get in touch with us and see where we can save you money during 1918.

INTERNATIONAL HALE GAS MIXER CO.

Pacific Coast Representative: C. B. BABCOCK CO., San Francisco. **Turk's Head Bldg., PROVIDENCE, R. I.**

The "DAYTON" COUPLING

Tight Joints
Perfect Expansion
Economical
Durable

Write for Catalog and state requirements

THE DAYTON PIPE COUPLING COMPANY

Manufacturers of

COUPLINGS, CLAMPS AND FITTINGS

Main Office and Factory

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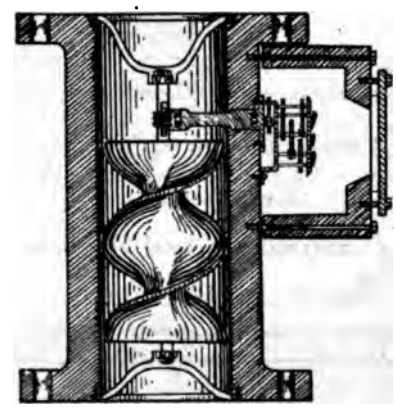
A Cleveland Rotary Meter
Will Solve Your Problem

For Natural Gas



For Artificial Gas

And here is the Meter that makes the story possible.

High or Low Pressure, uses no fluids of any kind.

Large or Small Volume, Capacity 20,000 cubic feet per hour and down.

There's the story in a nutshell.

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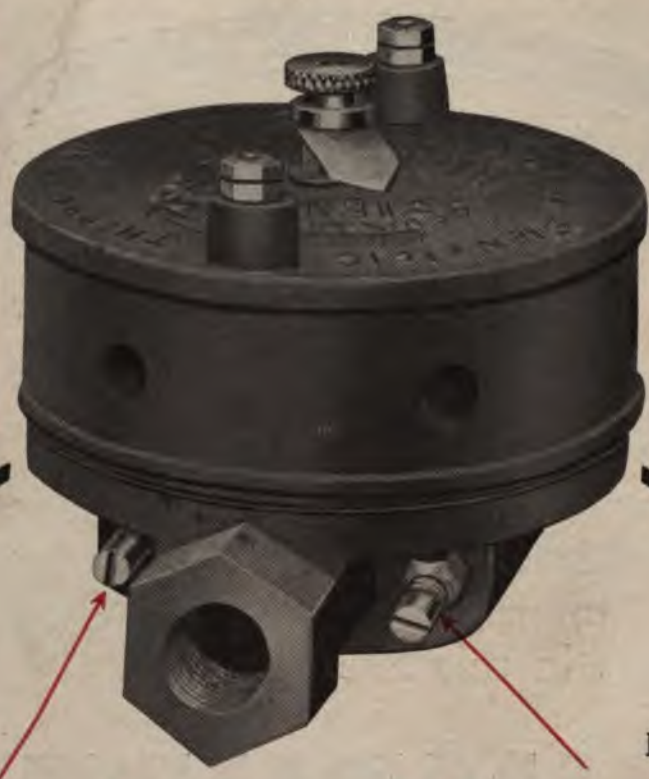

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Ask us how.

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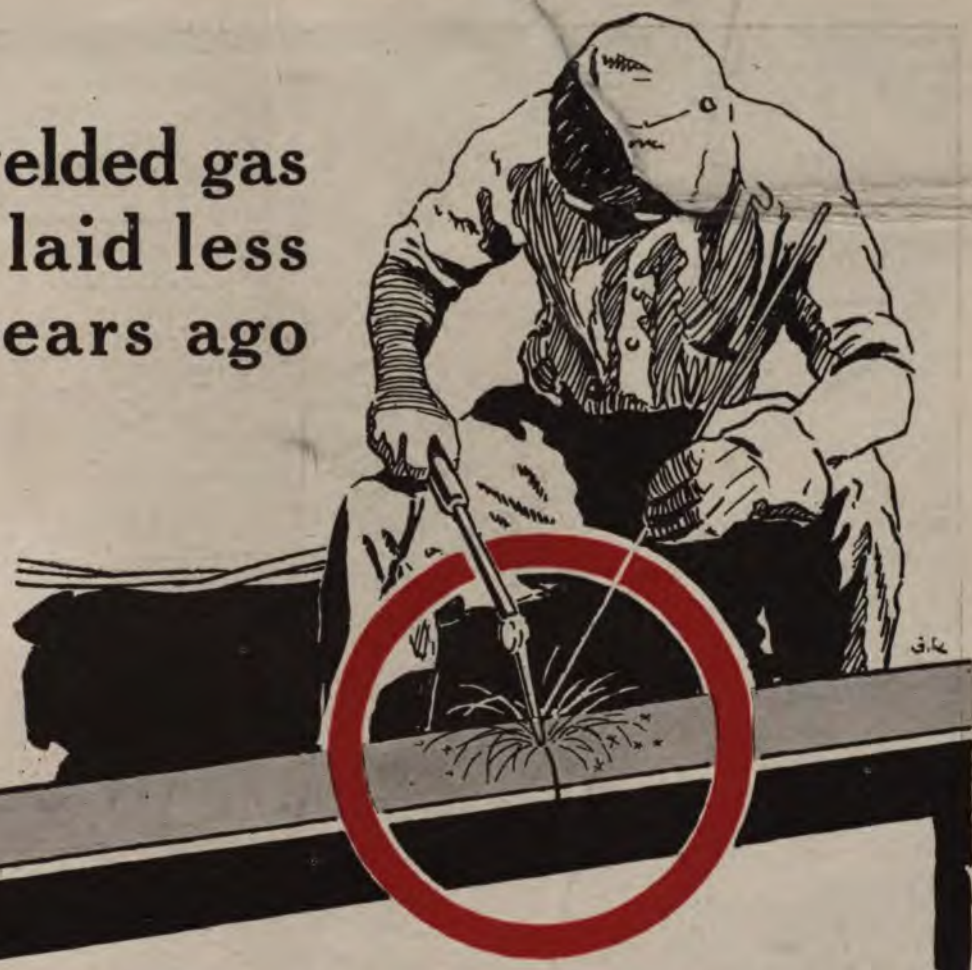

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